

GORGAS HOSPITAL
(Ancon Hospital)
Southwest of Gorgas Road
Balboa Heights Vicinity
Former Panama Canal Zone
Republic of Panama

HABS No. CZ-11

HABS
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDING^S SURVEY

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Department of the Interior
Intermountain Field Area
Rocky Mountain System Support Office
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GORGAS HOSPITAL
(Ancon Hospital)

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Location: Southwest of Gorgas Road, Northeast slope of Ancon Hill, Balboa Heights Vicinity, Former Panama Canal Zone, Republic of Panama, Central America

Panama, Tommy Guardia IGNTG, Series E962, Edition 1, revised 1992.
Universal Transverse Mercator Coordinates: Northing
990640 to 990980, Easting 659980-659960

Present Owner: United States Department of Defense

Original Use: Hospital

Present Use: Clinics, administration and barracks. Only the mortuary still serves its original function.

Significance: Gorgas Hospital was the first permanent United States medical facility constructed within the former Canal Zone on the Pacific side to handle health care for Isthmian workers and their families. Funding was authorized by the United States Congress in 1914 and construction began in 1915 and ended in 1919. The reinforced concrete buildings rendered in Italian Renaissance style and designed by Samuel Hitt, architect, were placed on the same site as the French Construction era L'Hospital Notre Dame du Canal. The Panama Canal Department of Operation and Maintenance's Building Division constructed 14 permanent buildings including an administration building, wards (6), laboratory, kitchen, crematory, dispensary, nurses' residence and a superintendent's residence and garage. The hospital buildings situated in Ancon on Ancon Hill, the major elevation on the Pacific entry side of the canal, are grouped within an elaborate site plan that allows views of Panama City and the Bay of Panama. From 1915 to 1928, the complex on Ancon Hill was known collectively as Ancon Hospital. The hospital was renamed in memory of Major General William Crawford Gorgas by joint resolution of the United States Congress in March of 1928.

Successful isthmian healthcare was an important factor in the completion and operation of the Panama Canal and Gorgas Hospital, the Canal Zone Health Department, and Dr. William Crawford Gorgas were crucial to that success. Gorgas Hospital and its staff also played a significant role in twentieth-century medical science, that resulted in the "discovery" of histoplasmosis as well as important tropical disease research. Gorgas Army Hospital is further significant for its impressive monumental architecture, its plan, and the vital role it played within the former Canal Zone's operations from 1915 to the present.

The hospital was transferred to the Department of Defense from the Panama Canal Commission in 1979 in accordance with the Panama Canal Treaty of 1977. The historic hospital complex was augmented with a modern Main Building constructed in 1965; the enlarged complex is currently known as Gorgas Army Hospital.

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Original Construction Date

1915-1919, 1941, 1951

2. Planner:

Samuel M. Hitt, architect
Meade Bolton, architect

3. Original and Subsequent owners:

Isthmian Canal Commission, The Panama Canal, Panama Canal Company, Panama Canal Commission, Department of Defense

4. Builders, Contractors and Suppliers:

The Panama Canal Department of Operation and Maintenance, Building Division,
Directorate of Engineering and Housing, USARSO (United States Army South)

5. Alterations and Additions:

Herrick Heights family housing was constructed as part of Gorgas Hospital complex in 1933-1934 to provide adjacent housing to hospital doctors and their families. The Mortuary and Chapel was constructed in 1941. Section O, also known as the Obstetrical Building, was added to the hospital complex in 1951. Finally, the modern Main Building of Gorgas Army Hospital was completed adjacent to historic Gorgas Hospital in 1965.

B. Historical Context

CONSTRUCTION OF THE PANAMA CANAL

Since the days of the first Spanish explorers, Panama has been a vital connection between the Pacific and Atlantic oceans. By the end of the 1530s and for centuries afterwards, the Isthmus of Panama was the shortest overland route between the gold and silver of Peru and Spain's Atlantic fleet. This traffic led to the development of Panama City on the Pacific side of the isthmus, and Nombre de Dios and Portobelo on the Atlantic. In addition, the Spanish also developed Fort San Lorenzo at the mouth of the Chagres River. The Chagres, which drains rainfall from much of the central isthmus into the Atlantic, was once a navigation route that covered more than half the distance between the oceans.

For both comfort and health reasons, most inhabitants of Spanish Panama lived on the Pacific side, which was considerably drier than the Atlantic littoral. During the rainy season, from May to December, the Pacific coast receives an average of 69 inches annually. The Atlantic side receives double that amount, around 130 inches (McCullough 1977:15-17). Rain meant disease in an area rife with malaria and yellow fever, and the Atlantic or Caribbean side of Panama was soon infamous for both. It is recorded that in the sixteenth century alone, over 46,000 people perished in Nombre de Dios.

As the Spanish Empire collapsed and new republics formed in Central America in the nineteenth century, plans for an interoceanic railroad and canal became increasingly popular. In the wake of the Mexican-American War, private interests in the United States constructed a railroad across the isthmus to facilitate mail transport and access to the gold fields of California. Stretching between Colon and Panama City, the railroad, though only 47.5 miles long, took five years to build (1850-55) and cost the lives of at least 6,000 workers, who died of cholera, smallpox, dysentery, malaria, and the most dreaded disease of them all, yellow fever.

Largely because of Panama's unhealthy reputation, the United States government soon looked to Nicaragua as the most likely location for an American canal across the isthmus. It was the French who first went to Panama in a valiant but ultimately unsuccessful attempt to build the first isthmian canal.

The French consortium that began the project was known as the Compagnie Universelle du Canal Interoceanique de Panama and was active in the field between 1879 and 1889. The French effort was ill-fated almost from the beginning. Finances were not well-organized, a problem compounded by the need to purchase the American railroad. Most of the work was let to subcontractors, which led to a confusing overlap of responsibilities. There was also poor planning at the top. The work was orchestrated by Ferdinand de Lesseps, excavator of the Suez Canal, who insisted until it was too late that the Panama Canal, like Suez, had to be dug to sea-level.

Despite these problems, the French canal might still have been completed had it not been for the disastrous ravages of tropical diseases, foremost of which were malaria and yellow fever. Disease cut huge swaths through almost every personnel level of the French project, leaving the company crippled long before it went into receivership in February of 1889. A second French company, Compagnie Nouvelle du Canal de Panama, was formed in 1894, but it did little practical excavation. The real purpose of the new company was to maintain the canal concession obtained from Colombia, and to sell the operation to the Americans.

In the wake of the Spanish-American War (1898), when the United States inherited overseas possessions in both the Caribbean and the Pacific, Americans became keenly interested in an isthmian canal. In 1899, Congress established the Isthmian Canal Commission (ICC) to study the potential routes, and this work intensified after Theodore Roosevelt became president in 1901. In early 1902, Roosevelt swayed the ICC in favor of Panama. Overtures soon followed to both the Compagnie Nouvelle for terms, and the Colombian government for lease on a "canal zone."

The failure of the Colombian congress to grant the lease led almost directly to an insurrection in Panama in November of 1903. Generous terms were obtained from the new Republic of Panama, leading to the creation of an American Canal Zone 10 miles wide, granted "in perpetuity" to the United States. The U.S. was given total jurisdiction within this zone, with all rights to railroad and canal construction. In addition, the United States was allowed the right to garrison and otherwise defend the Zone.

Construction of the Panama Canal began in 1904 and took 10 years to complete. Although the work was performed under the auspices of the Isthmian Canal Commission, headquartered in Washington, D.C., most real authority was exercised by the chief engineer on location, especially after the first disastrous year. There were three such chief engineers during the construction era: John Wallace, John Stevens, and George Goethals.

During the first year of construction, when John Finley Wallace was chief engineer, the project was plagued by a complicated and top-heavy bureaucracy. Despite the warnings of Dr. Gorgas and other health authorities, sanitation and disease control were not given the emphasis they deserved. When a yellow fever epidemic broke out in the spring and summer of 1905, droves of engineers and workers fled to the States. By the time Wallace quit in the summer of 1905, the American canal project appeared to be on the same course followed by the French.

Work resumed under the direction of the second chief engineer, John F. Stevens, whose greatest achievement was to turn the project around. A railroad man, Stevens saw that the greatest excavation problem was the disposal of dirt from the Culebra Cut, located along the low continental divide between the Pacific coast and the Chagres River basin. The rail system was reorganized to handle this kind of traffic, and excavation resumed. Just as important, Stevens recognized the medical requirements of the project, and gave free rein to Dr. Gorgas, who was at last able to bring yellow fever and malaria under control.

In February of 1907, Stevens was replaced by George Washington Goethals, the third and greatest of the chief engineers during the construction era. A product of the U.S. Army Corps of Engineers, Goethals oversaw the main excavation phase as well as the final construction phase of the canal project (McCullough 1977:507).

To complete the canal, Goethals refined a system of labor inherited from Stevens and Wallace. In addition to the American engineers, there was a huge aggregate of manual laborers, nine-tenths of whom were imported from either Barbados or Jamaica. American engineers and workers were housed in their own communities, and lived separately from the mass of black employees and other manual laborers. This led to the "gold" and "silver" system of employee segregation, which effectively divided the Canal Zone population into white and non-white categories. According to this system, gold employees (who were paid in US gold currency, whereas silver workers were paid in Panamanian silver currency), almost all of whom were white American citizens, received the better wages and the best housing.

The construction of the locks began with the first pouring of concrete in August of 1909. The last concrete was poured almost four years later, in May of 1913. That same month, the Culebra Cut (now known as the Gaillard Cut) was finally reduced to the required depth of 40 feet above sea level. In the fall of that same year, the cut was filled with water impounded by the massive Gatun

Dam. After completion of the locks, the canal was finally opened for business in August of 1914, just weeks after the opening rounds of the First World War.

In 1914, just before the canal was finished, Congress retired the Isthmian Canal Commission, creating in its place a regular Canal Zone government. Plans were also made to overhaul the Zone's medical system, including the main hospital facilities on Ancon Hill. Construction of the new Ancon Hospital buildings began in 1915 and was completed in 1919. By this time, military bases, planned prior to World War I, had been established within the Canal Zone.

In the late 1930s, Congress approved money for a third set of locks adjacent to the existing facilities located at Gatun, Pedro Miguel, and Miraflores. Construction began in 1939, but was cancelled as a result of deepening involvement in the Second World War. The conflict led to the further development of military bases throughout the Canal Zone, a trend that only continued during the Cold War.

By the 1960s, the Canal Zone was heavily militarized, with bases and installations located throughout the zone and even in non-contiguous areas leased from Panama. Ironically, these bases served to protect a canal that was increasingly considered obsolete. The Navy's largest aircraft carriers and most of the world's supertankers were already too large to pass through the locks. In addition, the rise of Panamanian nationalism became a constant goad for the revision of the Canal Treaty. The Carter-Torrijos Treaty, signed on September 7, 1977, and ratified by the U.S. Senate in April of 1978, was the end result. The treaty, which took effect in 1979, stipulated a 20-year transition between a militarized American Canal Zone, and a return to Panamanian sovereignty.

GORGAS HOSPITAL AND CANAL ZONE HEALTH DEPARTMENT: OVERVIEW OF HEALTH HISTORY ON THE ISTHMUS, 1880s-1979

In any review of health and sanitation on the Panamanian isthmus, three subjects are of paramount importance: Gorgas Hospital (and its antecedents, the Ancon Hospital and the French hospital before that); the Canal Zone Health Department; and Dr. William Crawford Gorgas. All three were crucial to the success of health care and sanitation work in the former Canal Zone. In fact, American success in the management of isthmian health care contributed enormously to the success of the American canal. Conversely, failure to control disease doomed the French effort more surely than planning mistakes or financial malfeasance.

Gorgas Hospital, on the slope of Ancon Hill, was the focal point of health care in the former Canal Zone. For years, it was the flagship of a medical and sanitation system implemented by Dr. Gorgas and refined by subsequent chief sanitary officers. As the headquarters of both medical and sanitation work on the isthmus, Gorgas Hospital was of paramount importance. The hospital facilities that preceded Gorgas were just as vital. In the era of the French companies, the main hospital, located where Gorgas is today, was known as L'Hopital Notre Dame du Canal or L'Hopital Central. In 1904-1905, during the American construction era, the same facility was augmented and renamed Ancon Hospital. Between 1915 and 1919, Ancon Hospital was totally rebuilt; in 1928, it was renamed in honor of Dr. Gorgas. The story of Gorgas Hospital is the story of health care on the isthmus, and that is an integral factor in the history of the canal itself.

French Era, 1879-1904

French canal construction began in the years that followed De Lesseps' initial visit to Panama in December of 1879. By the early 1880s, there was enough work ongoing to merit a system of hospitals to serve the medical needs of the French company employees. Just as the Americans would do years later, the French decided on two major hospitals, one located at each end of the [proposed] canal. The facility for the Atlantic side, based at Colon, was opened in 1882 with a 200-bed capacity (Breunle 1975:31-32; Panama Canal Review 1957:6). The facility for the Pacific side, which also served as the main hospital for the entire project, was established that same year on the slopes of Ancon Hill. Three years later, in 1885, the French also established a 25-bed sanitarium on Taboga Island [in the Bay of Panama] (Breunle 1975:32; Panama Canal Review 1957:6).

Ancon Hill was selected as the site of the main hospital because it was already the site of the Stranger's Hospital, a local institution financed by the Comision de Beneficencia and operated by a Roman Catholic sisterhood. Located at the upper end of a tract of land known as "Huerta de Galla," the Stranger's Hospital was used by the French until their own facilities were complete (Panama Canal Review 1957:2-3).

When the main French hospital was dedicated in September of 1882, it was given the name L'Hopital Notre Dame du Canal; later, it would be less formally known as "L'Hopital Central." Rated at a 500-bed capacity, with a maximum capacity of 700 patients, it was run by French nuns from the Sisters of Charity of St. Vincent de Paul, with help from black maids and orderlies (Breunle 1975:30-31; Falk 1958:122; Gorgas 1916:226). It cost five francs a day, or around \$1,

for a patient to stay at the hospital. Since the French company charged its subcontractors for this service, there was little incentive to send workers in for treatment. For the most part, only European employees received care, and only those with enough money to pay (Hospital Ancon 1923:1; Gorgas 1916:224-225).

The operation of the main hospital was supervised by Dr. Companyo, who had been with De Lesseps at Suez. Other early doctors were Frederick Pidoux, member of the Medical College of Paris, and Dr. Jean Pierre La Croisade. Pidoux is believed to have been head of the French "Sanitary Service," while La Croisade remained active at the hospital until the Americans arrived in 1904 (Panama Canal Review 1957:2; Gorgas 1916:226).

L'Hopital Central was constructed "pavilion style" over the 80 acres of Huerta de Galla. The 30 or more structures scattered over the property were constructed of wood with tile roofs. Water was supplied from springs located on the side of Ancon Hill. In addition to the hospital itself, a dairy and a farm were situated nearby to provide the hospital with food. Cooking was done at the central kitchen and distributed to the individual wards. As was common in those days, none of the buildings were protected by screens (Hospital Ancon 1923:1; Gorgas 1916:224-226).

Landscaping was an important and deadly feature of the hospital. In addition to the graded roads that connected the various hospital buildings, much of the 80-acre area was planted with flowers, shrubs, and trees, some of which were specially imported, like the Eucalyptus globulus (Gorgas 1916:224-225; Panama Canal Review 1957:3). To protect this valuable vegetation from the ravages of umbrella ants, pottery rings filled with water were placed around the base of each plant. A successful deterrent to the ants, the rings also provided a perfect breeding ground for the mosquito that carried yellow fever (Gorgas 1916:232). L'Hopital Central soon became a death sentence for many of the French patients, almost none of whom had immunity to yellow fever.

As Gorgas was to state later, conditions at the French hospital could not have been more favorable for the propagation of yellow fever. Not only were the plants protected from umbrella ants with water-filled clay rings, but also bed posts throughout the hospital were set in trays of water to keep ants off the patients. All of these precautions only guaranteed the breeding of mosquitos and the spread of disease. As records later indicated, almost every white non-immune patient at L'Hopital Central contracted yellow fever (Gorgas 1916:232), and the death rate ran between between one-quarter and one-third.

During the French construction era, a total of 5,618 deaths were recorded for all causes at the three French hospitals. Out of this total, malaria was responsible for 1,368, with yellow fever responsible for at least 1,026 (Breunle 1975:32; Ziperman 1971:11). Of these casualties, the vast majority died while patients at the hospital on Ancon Hill. Years later, Dr. Gorgas estimated that some 1,200 French employees died from yellow fever, most of whom perished while in St. Charles, the ward reserved for white employees at L'Hopital Central (Gorgas 1916:227).

With an overall mortality rate of 75 percent, L'Hopital Central soon garnered an evil reputation. Most workers tried to stay away. It has been estimated that for every patient who died in the French hospitals, another two or more died elsewhere, unable or unwilling to seek medical attention (McCullough 1977:159-60,172).

The disaster that occurred in L'Hopital Central was only a distillation of what happened throughout every level of the French project. At the height of excavation work, between 1884 and 1887, the total number of people engaged in the project at any given time fluctuated between 15,000 and just over 19,000 (Gorgas 1906:18). The vast majority of these were black workers imported from the French West Indies; at no point was the number of French employees more than 3,000 (Gorgas 1906:20; 1907:11). Out of this total group, the sick rate was high, estimated to have been as much as 630 out of 1,000. Even the official death rate was high: 67 out of 1,000, with the real rate probably more along the order of 100-plus per 1,000 (Gorgas 1905b:1-2). The death rate among the white French employees was even greater than the aggregate, with an estimated annual loss of around one-third (Gorgas 1916:149). In all, a total of 20,000 black and white workers, possibly as high as 22,000, died in the French attempt to dig the Panama Canal (McCullough 1977:235), and the major culprits in this slaughter were malaria and yellow fever.

Decimated by manpower losses and bad financial arrangements, De Lesseps' company went into receivership in early 1889. A few years later, a second French company was formed to secure French assets and retain the canal concession granted by the Colombian government. The Compagnie Nouvelle did little excavation work, and the hospitals inherited from De Lesseps' company went into decline. L'Hopital Central and the Taboga facility were little used, and the Colon Hospital became an almshouse. Several hospital buildings on Ancon Hill were turned into an orphanage run by the Sisters of Charity. By the time the Americans arrived, Dr. La Croisade was the chief surgeon and only physician in a hospital that had around 100 chronic patients (Breunle 1975:32-33; Panama Canal Review 1957:6).

The French attempt to build a canal in Panama had a noble, almost doomed quality about it. The brightest students of the Ecole Polytechnique had been sent to work miracles, all the while plagued by bad planning and financial mismanagement. The greatest problem, however, proved to be disease. In the 1880s and 1890s, neither the French nor hardly anyone else in the world knew how to deal with malaria and yellow fever.

History of Malaria and Yellow Fever

Malaria is one of the world's oldest diseases. It has been known in Europe and Asia for numerous centuries, and in Africa, for millennia. Sickle cell anemia, endemic to equatorial Africa, is believed to have developed as a defense against malaria. In the years after Columbus, the disease was taken to the New World, where it thrived just as in the Old.

Less dramatic than yellow fever, malaria was still greatly feared for its debilitating symptoms and the death that often followed. Unlike yellow fever, however, malaria could be treated. Quinine, an alkaloid of the cinchona bark of South America, was an Indian remedy popularized by the Spanish in Peru. Up until the twentieth century, quinine was the only known cure or treatment for malaria (Gorgas 1916:219-220; Encyclopedia Britannica, 15th Edition, 1986: Vol. 9:862). By the late 1890s, Sir Ronald Ross, a British physician with the Indian Civil Service, discovered that malaria, long believed to be caused by "bad air," or swamp vapors, was actually spread by the Anopheles mosquito, which deposits a parasite into human blood. For this discovery, Ross was awarded the Nobel Prize for Medicine in 1902.

Unlike malaria, yellow fever was an Atlantic-rim disease, found only in West Africa, southern Europe, and the Americas. For reasons unknown before this century (but having to do with the life-span of the mosquito host), the disease never took hold in India or East Asia. In the nineteenth century, it was argued back and forth whether the disease originated in West Africa or tropical America, the two areas of endemic infection, and the issue is still unresolved today (Gorgas 1903b:3; 1916:287; Finlay 1940:180-197).

Since at least the days of the Spanish Empire, yellow fever has had many centers of infection in tropical America. Panama was one, as were Veracruz, Havana, Rio de Janeiro, and even Quayaquil in Ecuador. In fact, most of the ports in Central and South America could be included in this list. These were areas where the disease was endemic, or present almost all of the time. By popular agreement, Havana was the most notorious infectious center: yellow fever had been

present there, without interruption, since at least 1762 (Gorgas 1916:3; Finlay 1940:116). Periodically and in the summer, the disease would also spread north, usually from Havana, invading American states along the Atlantic and the Gulf of Mexico (Gorgas 1909:8; Finlay 1940:47-48).

Aside from periodic visitations to the southern and Atlantic states, yellow fever has played a specific role in the history of the United States. Napoleon sold Louisiana (and Haiti gained its independence) at least in part because a powerful French army, sent to Saint-Domingue under the command of Napoleon's own brother-in-law, was virtually destroyed by yellow fever in 1802 (Lyon 1934).

In the nineteenth century, little was known about the cause of yellow fever, but much was known about its characteristics. Most people raised in endemic infection areas were immune as a result of relatively mild bouts of the disease in childhood. For this reason, serious outbreaks of yellow fever required the presence of non-immunes, or persons not raised in endemic areas. It was commonly assumed that yellow fever was the result of bad hygiene or sanitation, even though it was recognized that the disease was not spread by direct contact with the sick, but through intermediate articles or areas that had somehow become infected (Finlay 1940:50-54). Once the disease began, it came on suddenly, leaving the patient jaundiced or "yellow." High fever and black vomit quickly followed. For adults not previously exposed to the disease, the mortality rate was high, between one-quarter and one-third. Those who survived, however, had life-time immunity from future attacks.

Finlay's Mosquito Theory

Dr. Carlos Finlay of Havana was not the first to suggest that mosquitos spread yellow fever, but he was the first to attempt to demonstrate the matter scientifically. As early as 1879, Spanish authorities in Cuba appointed Finlay to work with American medical authorities in studying the causes of yellow fever. In 1881, he announced that the spread of the disease definitely required an intermediate agent, which he identified as the *Culex* mosquito (Finlay 1940:29, 63-66). (For taxonomic reasons, Finlay's mosquito was taken out of the genus *Culex* and identified as the *Stegomyia fasciata* in the late 1800s and early 1900s; in the 1920s, it was reclassified again to its present name, *Aedes aegypti*. Since *Stegomyia* was the name used during the period of greatest strides against yellow fever, it is the term used here in most instances.)

Finlay was drawn to the mosquito theory by the peculiar way in which yellow fever spread geographically. Diseases driven by smaller organisms, or "microphytes" in the terminology of that time, did not seem so dependent on weather conditions. Yellow fever, alternatively, disappeared with elevation and colder temperatures. The disease never spread at elevations greater than 4,000 feet, which happened to be the threshold of tolerance for Finlay's mosquito. Only this could explain why yellow fever never spread in Mexico City, despite centuries of close commercial ties with Veracruz, a major center of infection (Finlay 1940:50,66).

Although Finlay was absolutely correct in his diagnosis of the disease, he could not prove the matter. His experiments with yellow fever inoculations failed, and he was never able to transmit the disease using mosquitos under controlled circumstances (Finlay underestimated the length of time the disease had to incubate in the mosquito host; he thought it had to be 4 to 5 days, when in fact the minimum was 12). As a result, Finlay's mosquito theory was considered eccentric, and most people hewed to the belief that bad hygiene and poor sanitation caused the spread of yellow fever (Finlay 1940:81, 94; Gorgas 1916:14).

Cuba and the Conquest of Yellow Fever, 1898-1901

The brief Spanish-American War of 1898 gave the United States an overseas empire that included Puerto Rico, Guam, and the Philippines. It also resulted in the military occupation of Cuba and Havana. By the end of 1898, more American soldiers had died from yellow fever than from enemy fire (Gorgas 1916:4-5).

In 1899, a yellow fever board was established as part of a concerted effort to "sanitize" Havana and eliminate yellow fever. Carlos Finlay was appointed to this board by the provisional Cuban government. Also included were representatives of the U.S. military, including Army doctor William Crawford Gorgas. The board was also in close contact with U.S. Navy doctor J. W. Ross, director the Las Animas Hospital, Havana's yellow fever ward (Finlay 1940:30). Despite Finlay's presence on the board, the mosquito theory was not given much credence.

The clean-up program of 1899-1900 was totally without result. To the consternation of American military authorities, yellow fever actually appeared to get worse (Gorgas 1916:5-6). By 1900, yellow fever had become such a problem that the U.S. Army Medical Corps sent a board of officers to Cuba with orders to find the cause of the disease. The board, also known as the Yellow Fever Commission, was headed by Dr. Walter Reed and included Drs. Lazear, Carroll, and

Argamonte. More out of desperation than conviction, the "Reed Board" began working on Finlay's mosquito theory in June of 1900 (Gorgas 1903b:4; 1916:11-13). The Reed Board was assisted in this work by a vital piece of information that helped clarify the mosquito theory. Two years earlier, in Mississippi, a tight time-table for the spread of the disease had been established by Dr. Henry R. Carter of the U.S. Marine Hospital Service. Even though mosquitos were not suspected as the intermediate agent, the average time between infections in a new area was established at 17 days (Gorgas 1916:27-28).

Working with Finlay's theory and Carter's time-table, the Reed Board established test facilities at Las Animas Hospital and at a specially constructed laboratory at Camp Columbia, outside Havana. Begun in the summer of 1900, this work was given the full support of General Leonard Wood, then serving as governor-general of Cuba. Volunteers were culled from the many non-immune Spaniards in Havana, and from U.S. military personnel (Gorgas 1916:16-19). Using two screened but adjacent chambers, it was soon demonstrated that mosquitos and only mosquitos were capable of spreading yellow fever (Gorgas 1916:32-39).

The findings of the Reed Board, published in February of 1901, completely exonerated Finlay's theory. Not only was it proven that the *Stegomyia* (former *Culex*) mosquito spread yellow fever, it was demonstrated that other methods of potential infection were invalid (Finlay 1940:100-105). As the Reed Board demonstrated, yellow fever was caused by a "sub-microscopic parasite" (now identified as a virus) that could only be spread by the female *Stegomyia* mosquito. For the mosquito to become infected, she had to bite a person with yellow fever within three days of that person's exposure to the disease. Twelve to 20 days had to pass before the mosquito was then capable of passing the disease to another person. After being bit by an infected mosquito, a non-immune then had an incubation period of from three to six days before showing signs of yellow fever (Gorgas 1916:38-39; Martin 1987:7).

These landmark discoveries did not produce immediate results. The idea was first explored to give non-immunes some sort of inoculation, just as was done with other treatable diseases at that time. It was soon learned, however, that yellow fever was not easily controlled, and "light cases" could result in fatalities (Gorgas 1907b:2-3). The only other option, championed by Dr. Gorgas, was a direct attack on the disease's intermediary, the *Stegomyia* mosquito. Dr. Gorgas, who at this point was in charge of all sanitation work in Havana, began this work in February 1901; by September of that same year, yellow fever had been eliminated from Havana for the first time in almost 140 years (Gorgas 1916:50-62, 72).

William Crawford Gorgas was the perfect man to wage war against the yellow fever mosquito, both in Cuba, and later in Panama. Born in Mobile, Alabama, on October 3, 1854, William Gorgas was the son of Army officer Josiah Gorgas and Amelia Gayle, daughter of a former governor of Alabama. During the Civil War, Josiah Gorgas served brilliantly as head of Confederate ordnance, an achievement that would later work against his son's chances of entering regular service. Denied entry into West Point, William Gorgas fixed on the only other military career open him, that of army doctor. Graduating from the University of the South in 1875, Gorgas won a degree from Bellevue Hospital Medical College, and was commissioned as an army physician on June 16, 1880 (Noble 1921:615). In 1882, while serving at Fort Brown, Texas, both Gorgas and his future bride, Marie Doughty, contracted yellow fever. Both survived and were henceforth immune. In the years that followed, Gorgas was often posted to areas where yellow fever was either frequent or endemic (McCullough 1977:412; Breunle 1976:795).

Like most other medical authorities, Gorgas originally believed that yellow fever was caused by filth. After Reed's discoveries, Gorgas was converted to the mosquito theory, but retained his concern for "sanitation." Gorgas' special contribution to the war on yellow fever and malaria was his hold-over belief that the mosquito problem could be solved by massive clean-up, this time directed at the breeding places of the *Stegomyia* and *Anopheles* mosquitos; most medical authorities, including Walter Reed, thought such a large-scale task virtually impossible.

From the beginning of the mosquito campaign in Havana, it was thought impractical if not impossible to rid the city of all mosquitos, so efforts concentrated on the houses and buildings that were "infected" or were known to have *Stegomyia* mosquitos (Gorgas 1903b:8). First, all newly infected persons were placed in screened isolation, either at Las Animas Hospital or at their homes. Second, the infected house and the surrounding houses were fumigated to kill mosquitos. Third, as a purely prophylactic measure, stringent controls were placed on open water containers like cisterns and gutters to prevent mosquito breeding (Gorgas 1916:50-72).

While the control of yellow fever was the main item on the agenda, work also progressed on the containment of malaria, which Dr. Ross in India had just discovered to be spread by another type of mosquito, the *Anopheles*. In Havana, yellow fever was shown to be basically an urban disease, since the *Stegomyia* preferred to breed in pools of clear water adjacent to inhabited houses. Alternatively, the malarial mosquito preferred natural bodies of water in the countryside. This alone guaranteed that the campaign against malaria would be more difficult to win (Gorgas 1916:72-75). Despite this obstacle, however, Gorgas succeeded in curbing the two most dreaded

tropical diseases in a way that had never been tried before. It was Gorgas' insight, energy, and organizational skills that made the mosquito campaign a success, first in Havana, and later, on an even larger scale, in Panama.

American Take-Over Of The Zone, 1904

Two months after the United States and the new Republic of Panama signed the Canal Treaty in January of 1904, the Isthmian Canal Commission was reorganized under the Spooner Act to oversee canal construction. Despite the advice of the American medical establishment, no physician was selected to serve on the seven-man commission appointed to run the project. On the strength of his work in Havana, Gorgas was made the commission's "sanitary advisor" (Gorgas 1916:142-143).

Gorgas went to Panama on a short exploratory mission in March of 1904. The following month, he returned to the States to prepare the first report on what needed to be done to secure the health of workers in the new Canal Zone (Gorgas 1916:143-147). During this period, he also began to collect his staff, which included John W. Ross, Major Louis A. La Garde, Major Cassius E. Gillette, and Joseph Le Prince, among others. Gorgas returned to the Canal Zone to assume his duties on June 2 as "Chief Health Officer" in charge of the Health Department, a position he would hold until almost the end of the construction era (Chamberlain 1929:2; Isthmian Canal Commission 1905:7). Gorgas' position was also known as "Chief Sanitary Officer" of the "Sanitary Department," titles that Gorgas himself seemed to prefer.

The Americans inherited a total of 2,175 French company buildings. All were in bad condition. By the end of 1905, 22 had been demolished and 649 repaired; 58 new buildings were erected, with another 67 planned (Annual Report 1905:7). The buildings of L'Hopital Central, soon to be designated Ancon Hospital, were among the first repaired for American use. L'Hopital Central was turned over to the Americans on May 4. The first American nurses began cleaning the buildings in June, and the first patients were admitted on July 15 (Panama Canal Review 1957:7). The hospital in Colon was occupied on September 14, and a new emergency hospital was established at Culebra in October. The initial capacity of all three was less than 400 beds (Annual Report 1905:60).

Renovations at L'Hopital Central began in 1904 and continued into 1905. Stranger's Hospital was acquired, and one of its three wards was made the nurses' quarters. Many of the French buildings

were enlarged by adding a second story, with new buildings constructed as needed. Electricity and modern plumbing were added throughout. When the first round of work was completed in 1905, the hospital consisted of 96 buildings, with a capacity of 1,200 to 1,500 beds (Gorgas 1916:229-230; Panama Canal Review 1957:10; Hospital Ancon 1923:5). One of the new facilities at the hospital was the Health Department Laboratory, established in early 1905 to check the water supply for the Canal Zone and adjacent cities, and perform all necessary chemical, biological, and bacteriological tests for the hospital (Panama Canal Review 1957:11; Annual Report 1905:61-62).

The most significant change, however, was the screening of the hospital buildings, to provide protection against mosquitos. Anti-mosquito measures were also extended to the grounds. The lush vegetation inherited from the French was stripped away, leaving cleared swaths 200 yards-wide around each building (Gorgas 1916:233-234; Panama Canal Review 1957:10).

On July 13, 1905, after renovations were complete, "the U.S. Hospital on the northeast slope of Ancon Hill," the former L'Hopital Central, was formally renamed "Ancon Hospital" (Panama Canal Review 1957:7). This hospital continued to be the primary focus of medical and sanitation work on the isthmus. Other facilities quickly followed. The Taboga Island sanatorium, almost refurbished by the end of 1905, was designed to have 100 beds and serve as a recuperation center, since the island was generally free of both yellow fever and malaria (Annual Report 1905:61). In 1905, a temporary hospital for lepers, consumptives, and the insane was established in Miraflores. Emergency hospitals were also established in Gorgona and at Empire (Annual Report 1905:60).

To run this new medical system, Gorgas placed key people on his staff in charge of the most important aspects of health care. While Gorgas, as Chief Sanitary Officer, concentrated on yellow fever, Dr. William E. Deeks served as Gorgas' authority on malaria. Joseph Le Prince, a civil engineer from Columbia University, was made chief sanitary inspector, in charge of mosquito work in the field. Dr. John W. Ross, U.S. Navy, became the first director of the hospital system; later, this position would be held by Henry R. Carter (MacLaren 1972:11), the doctor who established the timetable for yellow fever. At Ancon Hospital, the main health facility, Major La Garde was appointed first superintendent, while Dr. A. B. Herrick served as pathologist and, later, chief surgeon (Panama Canal Review 1957:11; Gorgas 1916:229). Most of these people had worked with Gorgas in Havana (MacLaren 1972:11).

The Difficult Year, 1904-1905

When the Americans took control of the Canal Zone in 1904, there were around 15,000 persons living in the Zone, all without benefit of modern sanitation (MacLaren 1972:11). Matters were hardly better in either Panama City or Colon, both now the sanitary responsibility of American medical authorities, according to the terms of the Canal Treaty. In Panama, the streets had open gutters for the removal of refuse. Colon did not even have that. Neither city had a water system; cisterns collected rainwater beside each house (Abbot 1913:256).

Gorgas' Health Department had much to do that first year, and it rarely received full cooperation from the ICC. John Wallace, the chief engineer, solely concerned himself with the digging. Retired Rear Admiral John G. Walker, the first chairman of the Commission, denied that mosquitos caused yellow fever, despite the findings of the Reed Board three years earlier. To compound matters, the Chief Disbursing Officer, Carl E. Grunsky, held up most of Gorgas' supply orders (Breunle 1976:795-796).

Despite these obstacles, Gorgas and his staff attacked the mosquito problem with the resources at hand, using techniques that worked in Havana. In addition to creating a sanitary department from scratch, Gorgas began fumigating the infected areas of Panama City and Colon, house by house (Gorgas 1907b:4-5; 1916:150-153; Annual Report 1905:33). Other measures, however, suffered for lack of funds, and as the population of non-immunes increased in the Canal Zone, the stage was set for an outbreak of yellow fever.

The inadequacy of health and sanitation conditions in the Canal Zone was documented in a report prepared by Dr. C. A. L. Reed, president of the American Medical Association. Reed's report, published in March of 1905, contained charges so serious that the chairman of the ICC was forced to refute them publicly (Isthmian Canal Commission 1905). Reed's report documented how the Commission dragged its feet on the mosquito issue. Ancon Hospital, for example, ordered screens in July of 1904. They did not arrive until 1905, before which time Gorgas had been forced to cover the windows and doors with muslin. Reed's report stated bluntly that the Commission had thwarted the campaign against yellow fever and malaria (Isthmian Canal Commission 1905; Panama Canal Review 1957:10; Breunle 1976:796).

Almost as if on cue, an epidemic of yellow fever broke out among ICC employees the very next month. In April, there were nine cases of yellow fever and two deaths. In May, the numbers were

33 and 8, skyrocketing in June to 62 cases and 19 deaths, a mortality rate of almost one-third (Annual Report 1905:6-7). A general panic ensued that depleted the ranks of American personnel and forced an overhaul in the ICC.

ICC Reorganization, 1905

Essential to Gorgas' work was the reorganization of the Isthmian Canal Commission, which took place throughout 1905. As early as January, President Roosevelt asked Congress to replace the seven-member Commission with a smaller, more manageable group. Even though this was not done, Roosevelt demoted four of the seven members to honorary status in May. In June, John Wallace resigned as chief engineer, and was replaced by John F. Stevens the following month, at the height of the yellow fever scare (Breunle 1976:796). Roosevelt gave Stevens carte blanche to deal with construction, and Stevens gave Gorgas similar authority to deal with disease. Towards that end, in the fall of 1905, Stevens recommended that the Canal Zone Health Department (or Sanitary Department), be made an independent bureau, answerable only to the chief engineer. This development was formally sanctioned by Executive Order, on November 17, 1906 (Gorgas 1916:154-155; Breunle 1976:796; Annual Report 1907:31; Chamberlain 1930:5).

Development of Gorgas' Work, 1905-1907

In the summer of 1905, Gorgas was given free rein to wage war against the mosquito (Gorgas 1916:154-155). The first precautions took place at Ancon Hospital, where the work of screening the buildings was supervised by Le Prince, who had done similar work in Havana. Only one entrance was allowed per ward, and each consisted of a screened vestibule and double screen doors. A guard was posted to ensure that the first door was closed before the second was opened. These measures were effective; no cases of yellow fever were ever contracted at Ancon Hospital (Gorgas 1916:230-231).

At the height of the yellow fever scare in 1905, Gorgas decided to fumigate all of Panama City and Colon, not just the "yellow fever houses," as had been done earlier. This work, carried out from July 7 to August 19, was instrumental in curbing the epidemic (Annual Report 1905:33). By September, there were only seven cases and four deaths, which dropped to four and two in October. In November, there were no new recorded cases of yellow fever in either the Canal Zone or the adjacent cities (Annual Report 1905:6-7).

From this experience, Gorgas came to realize that the fumigation of infected houses was not sufficient to curb yellow fever. War had to be waged against all *Stegomyia* in order to drop the mosquito population below what Gorgas called the "yellow fever point," the threshold below which yellow fever could not spread (Gorgas 1907b:5; 1908:3-5). From this realization came the final distillation of Gorgas' plan for disease control on the isthmus: a holistic approach that required "sanitizing" huge sections of the Canal Zone.

With the full cooperation of the new chief engineer, Gorgas and Health Department personnel began to take control of the mosquito problem. The real development of the Health Department began during this period, when the rules and regulations that would later be famous were first put into play. Even Gorgas himself later stated that the period from the fall of 1905 to the fall of 1907 was the heyday of the Canal Zone "Sanitary Department" (Gorgas 1916:156). During this period, the Health Department was organized into the following branches: the hospital service, the health office of Panama City, the health office of Colon and Cristobal, the sanitary service of the Zone, the quarantine service, and the Ancon Laboratory (Annual Report 1905:59).

The sanitary service of the Canal Zone and the health offices of Panama and Colon were essential in the war against the mosquito. In 1906 alone, the work of the Health Department in Panama City consisted of street paving and cleaning, garbage collection, rat extermination, house cleaning and whitewashing, water distribution, and the work of the *Stegomyia*, *Anopheles*, and Disinfection brigades. The *Stegomyia* Brigade, which operated mainly in the city, inspected yards and houses for unprotected tanks, cisterns, and other water containers. Citizens who refused to seal these containers or otherwise make them secure against mosquitos, had them destroyed by the brigade. The *Anopheles* Brigade, which operated in the countryside, filled in abandoned wells, cut grass and dug ditches to facilitate water drainage, and applied anti-mosquito solutions to water sources too large to drain. The Disinfection Brigade removed tanks and gutters, and had the power to send infected persons to Ancon Hospital (Health Department 1906:34-36).

The development of a public water system for Panama City, Colon, and the Canal Zone communities was associated with this work and the gradual elimination of wells and rainwater cisterns (Chamberlain 1929:13). Plans for the system were drawn up by Major C. E. Gillette of the Army Engineer Corps (Gorgas 1907a:6-7). Completed in 1908, the system cost a total of six million dollars (MacLaren 1972:18). The main reservoir, established at Rio Grande, about 10 miles from Panama City, was designed to supply water to Panama City, as well as Ancon, Ancon Hospital, and the construction camps at La Boca, Culebra, Corozal, Pedro Miguel, and Paraiso

(Annual Report 1905:39-41). As public water was made available in the Canal Zone and adjacent cities, the brigades eliminated *Stegomyia* breeding areas by destroying or removing open water containers.

Even though yellow fever grabbed the headlines, Gorgas and his team recognized that malaria was a more serious health threat. Even in 1905, with the yellow fever epidemic, there were more deaths from malaria than from yellow fever. To make matters worse, there was no immunity from malaria, and natives, as well as foreigners, were susceptible. Just as the disease was more deadly, so the *Anopheles* mosquito was more difficult to control, since it bred in natural bodies of water and ranged over a much wider area (Annual Report 1905:34).

Gorgas' campaign against malaria was two-fold. First, liberal use was made of quinine, and everyone in the Canal Zone and adjacent cities was urged to take at least three grains per day. Quinine dispensers ranged over the work camps offering grains free of charge. Second, there was a systematic destruction of *Anopheles* breeding grounds, found throughout the Canal Zone. Since total *Anopheles* eradication was not possible, emphasis was placed on the areas around existing work camps and other inhabited areas of the Zone. Vegetation was cleared around all camps and settlements, employing mowers and machete crews. Miles of ditches were dug and subsequently kept free of vegetation. Fill from the Culebra Cut was used to fill swamps, and liberal use was made of both screening and mosquito bars (Annual Report 1905:34-35). To carry out this work, Gorgas divided the Zone into 25 or so "sanitary districts," each with a sanitary inspector. The job of these inspectors was to eliminate both adult mosquitos from the work areas and eliminate breeding areas within at least a mile of inhabited areas (Breunle 1975:43-44).

Work on local hospitals continued during this period. In addition to the main facility at Ancon, there were medical facilities in Colon, Miraflores, Gorgona, Culebra, and finally Empire (Denison 1906:586; Health Department 1906:26). Smaller dispensaries were also opened up at other locations along the canal route (Gorgas 1905a:9). The year 1905 also saw the renovation of Santo Tomas Hospital in Panama City. This hospital was enlarged at Canal Zone expense to serve as a major health facility for the Republic of Panama (Annual Report 1905:50-52).

The results of all this work told almost immediately. Yellow fever was virtually eliminated from the isthmus by the fall of 1905. Malaria, a much harder nut to crack, was also brought under control, with a disease rate that was well below the margin of acceptability. The war against the mosquito was so successful that the greatest cause of death in 1906 was neither yellow fever nor

malaria, but pneumonia, a problem that plagued workers imported from the Caribbean (Health Department 1906:3).

ICC Reorganization, 1907

The resignation of John Stevens as chief engineer, and his replacement by George Washington Goethals, precipitated yet another reorganization of the Isthmian Canal Commission in April of 1907. Goethals was made chairman as well as chief engineer of the new commission, which was heavily staffed with Army personnel to prevent any further resignations during the construction of the canal. In August, for the first time, Gorgas was made a member of the commission (Breunle 1976:797; Chamberlain 1929:65).

Soon, Goethals and Gorgas clashed over expenses incurred by the Health Department, and the remaining years of the construction era, until Gorgas' departure in late 1913, were marred by personal and professional differences between the two (Breunle 1976:797). Even though Goethal's arrival led to the erosion of some of Gorgas' administrative clout, the only thing more entrenched than Gorgas' health system was Gorgas' reputation. Overall, the position of the chief sanitary officer was virtually unassailable.

Gorgas' Empire: Health Organization in the Zone, 1907-1913

For the remainder of the canal construction era, William Gorgas and the Health Department enjoyed success and popularity in equal measure. Much of this achievement was due to Gorgas' skill in handling the health and medical problems of the Canal Zone. Gorgas established two levels of positions and responsibilities, with quarantine facilities and sanitary districts forming the bottom tier, and hospital facilities at Colon and Ancon comprising the upper. The apex of the upper tier was Ancon Hospital and the Laboratory.

Crucial to the success of the system were the quarantine facilities and the sanitary districts -- the "front line," as it were, in the war against tropical diseases. Each terminal port had a quarantine officer, who reported to a chief quarantine officer, who in turn answered to Gorgas. Each sanitary district had a sanitary inspector and a doctor. Sanitary inspectors answered to the chief sanitary inspector, who in turn reported to Gorgas. The chain of command for district doctors went through the hospital system, but ultimately, these too were answerable to the chief sanitary officer, William Gorgas.

The essential components of the Health Department were the sanitary districts that covered the Canal Zone and the cities of Panama and Colon. Averaging around 20 in number, depending on the requirements of construction work, these districts ranged in size from 15 to 35 square miles (Gorgas 1916:160; Annual Report 1908:315-322; Breunle 1976:796). Within each district, the sanitary inspector and the district doctor had overlapping responsibilities. The former worked to prevent disease, while the latter treated those diseases that still occurred. These two district officials, the sanitary and the medical, worked together to keep the sick rate far lower than canal planners had anticipated.

The sanitary districts and the work of the sanitary inspectors were organized by Joseph Le Prince, who served as the first chief sanitary inspector (Gorgas 1916:159,186). The main duty of each sanitary inspector was the eradication or control of both *Stegomyia* and *Anopheles* mosquitos. The *Anopheles* problem was the greater of the two, especially after 1905. As a result, the sanitary inspectors, each with a labor force of between 40 and 50 people, had to range widely over their districts to curb mosquito populations around the work areas (Gorgas c.1909:4-5).

The first order of business was the screening of buildings and the elimination of all mosquitos from within the buildings. Since the screening of regular-sized windows and doors interrupted natural breezes, buildings were soon designed to have screening across the whole veranda (Gorgas 1916:196). Mosquitos found inside any of these buildings were either fumigated or caught by hand.

Vegetation around each building was cleared for at least 100 yards (Gorgas c.1909:5), and sometimes double that (Gorgas 1916:182-183). Grass and other vegetation around the buildings was cut when it reached a foot in height. Keeping the vegetation under control made it difficult for *Anopheles* mosquitos to reach inhabited buildings, since they would have to run the gauntlet of sun and wind (Gorgas 1916:184, 187).

To eliminate *Anopheles* breeding grounds, work ranged far beyond the clearings around the buildings. Concerted efforts were made to eliminate swamps and other bodies of standing water within at least one mile of inhabited areas. As a rule, this was done by ditching. The best ditching was found to be tile drains, which did not need to be cleaned and presented no impediment to the grass mowers. Concrete ditches were second best, followed by open ditches, which required considerable maintenance (Gorgas 1907b:6; c.1909:5; 1916:186). Crude oil, or a form of larvicide developed in the Health Department Laboratory, was applied to areas too large to be drained.

Experimentation with different larvicides throughout this period led to results that were constantly made better and cheaper (Gorgas c.1909:6; 1916:188-190).

Another task of the sanitary inspector was the distribution of quinine to everybody within the district. Each day, quinine dispensers roamed among local workers, urging each to take the recommended quinine dose, which workers soon referred to as a "Panama cocktail" (Gorgas 1916:220-221; Abbot 1913:262).

Despite these precautions, some cases of malaria would still develop, and this became the concern of the district doctor, who had to report daily to Ancon the number of malarial patients in the district. If the rate was considered too high, then assistants from the chief sanitary inspector's office would visit the district to appraise the situation and alert the local sanitary inspector (Gorgas c.1909:5).

The district doctor also supervised district dispensaries and hospitals. Staffed by druggists, the dispensaries made quinine and a wide range of other medicines available free of charge. This brought the sick and potentially sick into the health care system, and was found to be the best way to discover new outbreaks of disease (Gorgas 1916:213-214). The next line of defense were the sub-district hospitals or rest camps. During most of the construction era, there were around 40 sub-district hospitals or rest camps that fed into the 20 or so district hospitals (Gorgas 1916:209-210). Throughout the Zone, the sick camps and district hospitals handled between 100 and 200 patients a day, usually for small-scale emergency treatment (Annual Report 1908:294).

District doctors could send those diagnosed with malaria or some other serious ailment to the hospital at Colon or Ancon. The most serious cases usually went to Ancon, which was by far the largest hospital, with around 1,500 beds (Gorgas 1916:223). As a rule, about half of these were filled at any one time (Annual Report 1908:293).

Patients were moved from hospital to hospital by way of special railway cars designed by Dr. Henry Carter while he was director of hospitals. These cars were screened and equipped with canvas beds. Hospital ambulances met the train to transport patients to facilities at either Colon or Ancon (Gorgas 1916:210-212).

No one was forced to use the hospital facilities, but there were incentives to do so. If a patient received medical attention at home, there was a charge of \$1 per doctor's visit. Alternatively, a

stay at the hospital was free, at least for all ICC employees. The family members of employees who made more than \$50 a month were assessed a fee of \$1 a day; more was charged for a private room. Family members of employees who drew less than \$50 per month were charged \$0.30 a day. Patients who were not employees or family members of employees were charged \$2 a day. Surgery, if needed, was provided free of charge (Gorgas 1916:246-247).

Since the average daily sick count was around 900 to 1000, the charges assessed to patients did not begin to cover the costs of running the hospital system, which employed around 100 doctors and an even greater number of nurses. The Canal Zone hospital system absorbed more than half of the funds expended by the Health Department (Annual Report 1907:32; Gorgas 1916:208). Gorgas dealt with this problem by concentrating money on the best doctors, supplies, and equipment, while making do with the buildings inherited from the French (Gorgas 1916:208).

Despite this frugality, renovations at Ancon Hospital, begun in 1904 and largely complete by 1905, continued on until 1909. The cost to the government was almost \$500,000. During most of the construction era, there were some 96 frame buildings on the sprawling 80 acre tract that comprised the hospital grounds (Panama Canal Review 1957:11). Buildings and services included: 47 wards in 32 buildings, an admitting office, administration building, Board of Health laboratory, laundry, kitchens and mess houses, storehouses, 18 quarters for married employees, four nurses' quarters, bachelors quarters, chapel and a separate compound for the Canal Zone Insane Asylum. Towards the end of that era, after the *Stegomyia* mosquito had been virtually eradicated from the Ancon area, landscaping and ornamental plants were again allowed around the hospital buildings; this time, poison was used against the umbrella ants (Gorgas 1916:233-234).

Ancon Hospital itself was arranged so that every two wards had a dining room and diet kitchen between them. The bulk of the cooking was done in a large kitchen near the center of the hospital complex, where food was prepared for more than 2,000 people. Meals were then brought to individual wards in handcarts (Gorgas 1916:237).

Aside from wards for the regular patients, there was also a ward for the insane. Between 1907 and 1915, Ancon Hospital contained an insane asylum that served the Zone and the Republic of Panama. By 1913, the asylum contained 250 patients, more than half of whom came from Panama. To cover the cost of treatment, the Panamanian government was charged \$0.75 a day for each of its nationals (Annual Report 1907:32; Chamberlain 1929:45; Gorgas 1916:242-243).

Other facilities at the Ancon Hospital included the Medical Clinic, developed under the supervision of Dr. W. W. Deeks. The Operating Room, built by the French and enlarged by the Americans, was surrounded by seven to eight surgical wards. This facility was run by Dr. Herrick, who served as chief surgeon during most of this period. The Eye Department was established by Major Theodore C. Lyster for eye, ear, nose, and throat work. The Research Laboratory developed by Dr. Samuel Darling was critical to the success of the sanitary work in the Zone. The Laboratory did research for the sanitary districts and pathological work for the hospital (Gorgas 1916:237-242). Other structures nearby included the house of the hospital superintendent, a laundry, dairy, and other farm facilities (Gorgas 1916:243-245).

Adjacent to the hospital was Ancon Cemetery, which opened in 1904-1905 and contained around 2,000 burials by the time the canal was finished. Ancon, however, was not the only cemetery during the construction era. In addition to the grounds at Mount Hope, each sanitary district had its own cemetery, where burials were registered by the district inspector (Gorgas 1916:214-216). Still other facilities were maintained during this period. The Taboga Sanitarium inherited from the French was enlarged and made into a 120-bed convalescent hospital (Gorgas 1916:249). In 1906-1907, the Palo Seco Leper Colony was constructed and occupied (Annual Report 1907:32). Established by Dr. Carter, Palo Seco also took in Panamanian lepers, at a cost to Panama of \$0.75 a day per patient. By the close of the construction era, the colony contained around 50 patients (Gorgas 1916:256-257; Health Department 1914:12-13). During this period, even the Santo Tomas Hospital in Panama City was supervised by the Canal Zone Health Department (Health Department 1914:13).

By the time William Gorgas left the Canal Zone in late 1913, his legacy was well-established. The institutions he created through the Health Department had been essential to the construction of the canal, which would never have been completed without the control of yellow fever and malaria. As Gorgas himself pointed out, a comparison of the sick rates alone demonstrate the success of the department. In the 1880s, the French company had a sick rate that was officially 333 out of 1,000, but was probably more along the order of 600/1,000; the U.S. Army in Cuba had an equivalent ratio. Even in the Philippines, without the threat of yellow fever, the Army's sick rate was 300/1,000. At the beginning of American canal construction, it was hoped that the work force could be kept to a sick rate of 50 per 1,000. The actual rate turned out to be less than half that, or 22/1,000 (Gorgas 1916:206-207, 279-280). Gorgas not only ran one of the first effective health programs in the tropics, he also put an organization in place that continued to run well after his departure.

With the conquest of yellow fever and the curbing of malaria, Gorgas took an interest in pneumonia, which continued to plague many of the Caribbean workers imported to dig the canal. This interest led to an invitation from the South African Chamber of Mines to study pneumonia among black workers there. To Gorgas' surprise, Goethals gave him leave to go, and he was replaced as chief sanitary officer by Lt. Col. Charles F. Mason, the superintendent of Ancon Hospital (Breunle 1975:52). Gorgas left the Zone in October 1913, and was in Africa when he received word of his promotion to Surgeon-General of the U.S. Army. He returned to the United States in 1914, before the outbreak of World War I, and was instrumental in preparing the Army for the coming conflict in Europe. Gorgas sailed to France in 1918, and retired from active service later that year. Honored throughout Europe and Great Britain after the Armistice, Gorgas died in London on the 4th of July, 1920, just a few months shy of his 66th birthday (Noble 1921:621-623).

Reorganization of the Canal Zone, 1914

In April of 1914, on the eve of the opening of the Panama Canal, President Wilson issued an executive order that abolished the Isthmian Canal Commission (Breunle 1975:52). In its place was established "The Panama Canal," a governmental entity responsible for both canal operation and activities within the Zone (Falk 1958:50). Gorgas' old Health Department, or "Sanitation Department," as he preferred to call it, was reorganized (Breunle 1975:184). The new Health Department was now directed by a "chief health officer" who reported directly to the Canal Zone governor (Breunle 1975:52-53). The Health Department was also split into three divisions: quarantine, sanitation, and hospitals and charities (Mason 1916:88-89).

Rebuilding Ancon Hospital, 1914-1919

After the completion of the canal in 1914, the Panama Canal Commission began to design and construct permanent communities within the Panama Canal Zone. This era of permanent construction lasted from 1914 to 1920 and the new Ancon Hospital was an architectural landmark of this period. Linked by geography, design and the precepts of urban planning to the planned capital of the Panama Canal Zone, Balboa-Ancon, the proposed hospital complex was centralized and modernized to suit the health needs of the post construction-era residents.

The design of the proposed hospital complex with an 800-bed capacity that reflected Chief Engineer Goethals' vision for permanent buildings in the zone was under study by 1913.

Goethals' vision was inspired by the "City Beautiful Movement" and emphasized collaborative planning by architects, landscape architects, and planners as the key issue in the creation of well-designed communities. The City Beautiful Movement would impact military communities in the United States and in Panama after World War I. The creation of planned communities such as Balboa-Ancon in Panama fully predated this later trend at American military installations and perhaps shaped the later stateside changes. In Panama, this collaborative action was ventured with civilian architects and landscape architects working with military personnel such as the quartermaster.

A study of the new hospital was first completed by Austin Williard Lord, a Minnesota native and a M.I.T. alumnus. After graduating in 1888, Lord won a scholarship that supported two years of study at the American Academy of Rome. He returned to New York in 1890, working with McKim, Mead and White until establishing his own firm with two partners under the style of Lord, [Monroe] Hewlett, and [Washington] Hull in 1894. By 1913, the firm was known as Lord, Hewlett and Tallent. The Fifth Avenue firm was responsible for designing various public buildings in the greater New York area.

Lord was appointed to the Isthmian Canal Commission to design permanent structures in the maintenance of the Canal on July 1, 1912. His appointment as Architect to the Isthmian Canal Commission coincided with his directorship of the School of Architecture at Columbia University between 1912 and 1915 (McMillan Encyclopedia of Architecture:32). Presumably, his experience with public architecture and his European experience were factors in his two-year appointment which lasted until the 1914 reorganization. His assistant, Mario J. Schiavoni, represented the firm on the isthmus while Lord worked out of his New York office. His firm is credited with establishing Italian Renaissance as the signature style for all permanent buildings in the Canal Zone and is responsible for the layout and design of Balboa-Ancon's permanent architecture. This style rendered with arcades, exterior collonades, and arched windows was selected for its compatibility with tropical weather and Panamanian topography.

A plan submitted to Congress in 1913 by the Acting Secretary of War shows a long, two story, Spanish Colonial style building was first advanced by the Surgeon General's Office not Lord as a suitable facility for the Canal Zone (House of Representatives, 63rd Congress, 1st Session Document No. 276). Lord's concept for the new hospital was never developed or published as his appointment ended with the 1914 reorganization. Despite this, Lord published in *Architecture* his evaluation of the proposed siting of the new Ancon Hospital. He complimented the French and

later American layout of the early canal architecture, noting that most buildings had served their intended purpose. "The conditions of site" of the Ancon Hospital which offered "many difficulties and yet great advantages" he used as a case in point. Lord noted that the French were skillful in their disposition of paths and drives and the selection of proper sites for various buildings on the low spurs of Ancon Hill. "If Ancon Hospital is to be rebuilt with more permanent structures, it is likely that the lines laid down by the French will, to a great extent, be followed" (Lord 1914:98). While Lord's overall contribution to the development of the Panama Canal Zone's permanent architecture and its planned communities such as Balboa was immense, he casually disappears from the scene after 1914. Samuel M. Hitt instead takes Lord's place as arbiter of zonian architecture and it is Hitt that designs and lays out the new permanent hospital complex.

The Report of the Resident Engineer, Building Division in 1915 to the Governor of the Panama Canal gives some sense of the change in hierarchy and responsibilities of those charged with the building of permanent communities and buildings within the Canal Zone. A reorganization occurred in 1914 in which the Building Division, once part of supply, was organizationally placed under the direct charge of Superintendent R. W. Whitaker for canal structures in the Balboa area and vicinity. George M. Wells was placed in charge of the Building Division as resident engineer and the post of Constructing Quartermaster was abolished.

The Building Division was divided into five organizational sections which embraced four geographic areas or districts and a design group. Balboa-Ancon fell within the purview of the Southern District taking in all building operations south of Corozal and headed by Superintendent R.W. Whitaker. The fifth section, Designs, was divided into two departments: architecture and engineering. Samuel M. Hitt, architect, was responsible for all architectural designs while T. C. Morris, assistant engineer, handled the design of foundations, reinforced concrete details and the size and dimensions of building supports.

A special committee to study additional options for the new facilities under the aegis of the newly organized "The Panama Canal" concurred with Lord's analysis for the siting of the permanent hospital. This committee, which consisted of Captain Robert E. Wood, then Chief Quartermaster of The Panama Canal (resigned May 1915) and later CEO of Sears and Roebuck and Company; Dr. A. B. Herrick, then acting superintendent of Ancon Hospital; and Samuel M. Hitt, Lord's replacement, recommended that the old hospital be replaced by a completely new facility located at the same site (Panama Canal Review 1957:12). The committee specified that five ward buildings should be built on a spur of Ancon Hill with a kitchen, dining room, administration and out-patient

building in the center. The wards were essentially pavilions, detached and dedicated to a specific use, but connected through covered passageways.

A plan titled "Ancon Hospital, Ancon, Canal Zone: General Layout of Development by the United States Government- 1915-1919" drawn by Samuel Hitt shows the new hospital's proposed layout and the surrounding topography. The height and prow-like configuration made by Sections A and B and the Administration and Clinics Building dominated the hospital complex. Constructed on a terraced spur, these three monumental buildings constructed with funds appropriated by Congress in April of 1915 were the first hospital buildings under construction (Panama Canal Review 1957:12).

Materials and the method of construction for the hospital buildings received much study as engineers and architects worked with health officials to strike a balance between economy and health department building requirements. The latter required exterior and interior finishes that did not allow chipping, cracking or denting; and that should also be able to withstand antiseptic washings without injuring the finish. Poured reinforced concrete was selected for veranda and main building walls, while floors that spanned from wall to wall across a building were to be made of reinforced concrete finished in terrazzo, mosaic tile, or a composition flooring. Reinforced concrete was also selected for "intermediate walls," six inches or over in thickness. Walls less than 6 inches in thickness were to be laid with hollow cement blocks plastered with two-coat cement and sand stucco troweled to a smooth dead surface. The concrete walls were rubbed and filled to a similar finish.

To meet the health departments' requirement concerning a hard finish, Building Division engineers used a treatment that was first discussed by Charles MacNichol in a paper read before the American Society for Testing Materials in 1910. The treatment consisted of two washes of sulfate of zinc mixed in equal parts by the weight of the zinc and water, followed by two coats of oil based paint and a final finish of enamel washable wall paint. By following this new method, engineers were able save \$12 per 100 square foot over the normal application and were able to gain a more durable surface treatment (*Engineering News* 1916:443).

Section A (Building 255), the first unit of the permanent hospital, opened in June, and was reserved for "white American male" patients. Section B (Building 253), the second unit of the permanent facility, was located over the sites of Wards 1 and 2 of the old hospital. It was still under construction in 1916 (Health Department 1916:10-11). During this transitional period, Old

Ancon Hospital buildings were mixed with the new construction. Historic photographs show this juxtaposition where the old frame operating room sat on the terrace in front of the new concrete Administration and Clinics building. Wards 3 and 4 of the old hospital were vacated and destroyed to make room for work on the first wing of the permanent hospital. The removal of the Insane Department to Corozal also occurred in 1915 (Health Department 1915:11). Other buildings were simply moved to new locations and readapted to a new use, accommodating the new construction.

A concrete crematory was also under construction in 1915 near the site proposed for the permanent laboratory. Completed in January of 1916, the Building Division turned it over to the Health Department.

The Board of Health Laboratory (Building 235), the main lab facility for the Health Department, was occupied in February of 1917. This building contained facilities for bacteriologists, pathologists, chemists, and entomologists, as well as facilities for undertakers. Also located in this building were autopsy rooms, a photo studio, library, museum, and a basement for keeping animals (Health Department 1917:13,17-19).

Section B (Building 253), the second ward unit of the new hospital, was completed and occupied in April of 1917 with a capacity for over 100 patients. It contained 37 private rooms, seven small wards, two cells, and service rooms (Health Department 1917:14). The following month, the Admitting Office and Dispensary Building was occupied. Finally, in December of 1917, the Administration and Clinics Building (Building 237) was partially occupied, even though some facilities were not quite finished. At the end of 1917, the completed facilities included the drug store in the basement, the medical clinic and eye and ear clinic on the first floor, and the administrative offices and file rooms on the second. Not yet finished were the X-ray clinic on the first floor, the library and reading room on the second, and the surgical department on the third floor (Health Department 1917:14).

The focus of the new complex was the Administration-Clinics Building. With three stories and twin towers on the sides, it provided an architectural focus for the other hospital buildings. The first floor contained an admitting office, general waiting room, medical clinic, X-ray clinic, and eye and ear clinic. The second floor contained the office of the hospital superintendent, offices for clerical workers, a board room, library, and file rooms. The third floor was set aside for the surgical clinic. The basement contained a pharmacy, linen room, and various storerooms. The

three floors and the basement were connected by both stairways and an electric elevator (Health Department 1918:18; 1919:39).

More specifically, the medical clinic, located in the south corner of the first floor, contained an office for the chief of the clinic, a women's and a men's examining room, dressing rooms, and a clinic laboratory (Health Department 1918:19). The X-ray clinic, located in the north wing of the first floor, had an office for the chief of the clinic, waiting rooms for colored and white patients, an X-ray and therapeutic room, transformer and machinery room, developing room, file room, and supply storeroom (Health Department 1918:20). The eye and ear clinic, situated in the south wing of the first floor, contained a chief's office, general examination room, operating room, refracting tunnel and dark room, as well as rest rooms and waiting rooms for white and colored patients (Health Department 1918:19).

The second floor, devoted to administrative and clerical functions, was divided into three parts: north and south wings, divided by a central section. The north wing contained the hospital superintendent's office, library, reading and board room, two sets of bachelor's quarters, a stationery storeroom, and a janitor's closet. The south wing contained clerical staff lockers and toilets, as well as a fire-proof filing room designed to hold the case histories of over 200,000 patients. Also in the south wing was the local office of the American Red Cross, as well as the Canal Zone chapter of the Home Service Committee. The central section contained work areas for the clerical staff, with public and private work areas separated by an open grill partition (Health Department 1918:18).

The third floor had only one tenant, the surgical clinic. The north wing contained four operating rooms, each equipped with skylights and auxiliary storage areas. The south wing contained the clinic laboratory, a women's examining room, an emergency sterilization room, nurses' restroom, two emergency examination/operation rooms, and a linen room. The central section had an anesthesia room, surgeons' lounge and locker area, nurses' office, men's examining room, and the office of the chief of the surgical clinic. This section also contained waiting areas, public toilets, and a soiled linen room with a chute to the basement (Health Department 1918:18-19).

Section A, located to the right and front of the Administration-Clinics Building, was a two-story building set aside for most white American male patients associated with the medical, surgical, and eye and ear clinics (patients with contagious diseases were routed elsewhere). Each floor of Section A contained two large wards separated by a central service area. Each service area

contained a nurse's office, doctor's office, a laboratory, cell, and dining room (Health Department 1919:39).

Section B, located to the left and front of the Administration-Clinics Building, was another two story structure (with basement). This one was set aside for white female patients associated with the medical, surgical, eye and ear, and obstetrical clinics; white children; and white male private room patients. Section B contained 40 private rooms, seven small wards, two cells, a complete maternity department, as well as a central service section (Health Department 1919:39).

Sections C and D were located in one three-story building, with basement, situated to the rear and right of the Administration-Clinics Building. Each floor contained two pairs of wards on either side of a central service area. Section C contained the wards for colored male patients and white male foreigners; Section D had the wards for white and colored children and colored women (Health Department 1919:39-40).

The normal capacity of the new hospital, including all wards, was rated at 800 beds; the average number of patients at any one time was estimated at around 500. The hospital staff totaled around 400. In addition to the superintendent of the hospital, there were 25 doctors, 10 interneers, 91 graduate female nurses, 3 male nurses, and 271 other employees (Chamberlain 1929:44).

One of the most important buildings in the new hospital complex was the Board of Health Laboratory, a two-story "U"-shaped building centered around a courtyard. This contained the main laboratory facilities not only for the hospital, but also for health operations throughout the Canal Zone. The ground floor of the central section, on both sides of the main entrance, contained a clerk's office, filing room, pamphlet room, library, main storeroom, laboratory room, and museum. The second floor of the central section contained a bacteriological laboratory and related facilities. The east wing was largely devoted to the study and treatment of human remains: the ground floor contained the embalming and undertaking department, the undertaker's office, refrigeration room, and embalming room; on the second floor, the pathologist's laboratory, autopsy room, and general laboratory room. The west wing was largely devoted to chemical studies: the ground floor contained a chemical laboratory, chemist's office, and chemical storeroom; the second floor had the director's office and laboratory, photographic dark room, and a small bedroom. The basement, located under the west wing, housed various animals (Health Department 1919:40).

In the late 1920s, the laboratory staff consisted of three physicians, two chemists, five technicians, one undertaker, and nine other employees (Chamberlain 1929:45). The crematorium, considered a part of the laboratory complex, was located in a separate building immediately adjacent to the east wing and connected to it by a concrete walled and roofed passageway (Health Department 1917:14; 1919:40). By the 1920s, if not before, the crematorium was equipped with two retort oil-burning crematories (Chamberlain 1929:45).

At least four other permanent buildings were constructed as part of the hospital complex: the dispensary and admitting office; kitchen and mess hall; nurses' quarters; and the isolation building. Located on the road below the main entrance to the hospital, the dispensary and admitting office was housed in a single two-story building. The first floor had offices for two doctors, waiting rooms for white and colored patients, an admitting office, pharmacy, and examination room; the second floor had two dental suites and quarters for medical personnel. Behind the dispensary building was the hospital garage, which contained a workshop and six stalls (Health Department 1917:14; 1919:41).

The new Kitchen and Mess building, also known as the Steward's Department, was located directly behind the Administration-Clinics Building. Two-stories high, with a basement under the south end of the building, the kitchen and mess hall contained a main kitchen and "silver" dining room on the first floor, with dining rooms for medical personnel and patients on the second floor. The main kitchen on the first floor contained refrigeration boxes, a butcher shop, storeroom, and diet kitchen. Located in the basement were the bake shop, refrigeration machinery room, elevator machinery room, diet dispatch room, locker room, and toilets. Equipment for the new kitchen and dining room facilities totaled \$10,000 (Health Department 1918:21; 1919:40).

The new nurses' quarters was a three-story building, with a small service basement, located near the base of the main stairway entrance to the hospital. The building contained 72 bedrooms, a recreation room, and a suite for the head nurse. A small laundry and trunk storeroom were located in the basement (Health Department 1918:20; 1919:41).

The new three-story Isolation Building was located behind and to the left of the Administration and Clinics. With a rated capacity of 90 patients, this building was designed to house all isolation cases, both colored and white, as well as all cases of pulmonary tuberculosis. The first floor contained two four-bed wards and nine private rooms. The second and third floors each had two

11-bed wards and three private rooms. The basement contained an orderlies' room, receiving ward, offices for nurses and doctors, storerooms, sterilizing rooms, and a room for the elevator machinery (Health Department 1918:20; 1919:40).

The year 1918 saw the final work completed on the Administration and Clinics Building. Office workers and the hospital superintendent began administrative functions in their new second-floor facilities in January (Health Department 1918:18). In February, the surgical department (or clinic) occupied its third-floor facilities, furnished with \$5,000-worth of new furniture and equipment. By the end of the year, a total of 6,208 operations had been performed in the new facilities (Health Department 1918:18-19). The other clinics within the Administration and Clinics Building also went into full operation that year (Health Department 1918:19-20).

Other buildings completed in 1918 included the kitchen-mess hall (Building 238), occupied in March; the three-story isolation building (Building 242), occupied in July; and the new nurses' quarters (Building 263) (Health Department 1918:20-21). In fact, with the exception of Sections C (Building 236) and D (Building 224), all permanent hospital buildings were completed by the end of the year (Health Department 1918:18-19).

The last permanent facilities at Ancon Hospital of this era were completed and occupied in 1919. This included Section C (Building 236), the ward designated for non-white and foreign white male patients, and Section D (Building 224), set aside for white and non-white children and black females. The completion of the Superintendent's Quarters (Building 286) in June marked the finish of all authorized buildings at Ancon Hospital (Health Department 1919:38).

When completed, the new Ancon Hospital was the premiere health facility in Latin America. Located on the site of the French hospital, the new facilities were more compact, each building having between two and four stories. A total of ten buildings were constructed for Ancon Hospital between 1915 and June of 1919 (Falk 1958:122). They included: the Administration-Clinics Building (Building 237), Section A (Building 255), Section B (Building 253), Section C (Building 236), Section D (Building 224), Laboratory and Crematory (Building 235), Admitting Office and Dispensary (Building 287), Kitchen-Mess Hall (Building 236), Nurses' Quarters (Building 263), and Isolation (Building 242). The new hospital cost around two million dollars, with hospital equipment costing another million (Hospital Ancon 1923:5-7; Hess 1920:3).

In addition to the new hospital buildings, the grounds received a facelift. With the virtual eradication of the *Stegomyia* mosquito from the vicinity of Ancon Hill, hospital landscaping returned to the excess of the French era, with many imported exotics. Much of this work was supervised by Elmer F. Ohlson, an orchidologist and the hospital's chief clerk (Panama Canal Review 1957:13).

Other Changes to the Hospital System, 1916-1928

Even though most of the new hospital work was concentrated at Ancon, the reorganization of the Canal Zone health system affected smaller facilities as well. A new hospital for Colon was approved in 1915, with concrete facilities replacing the old wooden structures by April of 1916. The new Colon Hospital, consisting of four concrete buildings connected by arcades, had accommodations for 65 patients (History n.d.:1; Chamberlain 1929:46). The Taboga Sanitarium, the other relict from the French era, was closed as a health facility in January of 1914; the buildings were turned over to the Supply Department for use as a hotel (Health Department 1914:12).

New facilities were also built, such as the Corozal Hospital. Established to care for the insane relocated from Ancon, the Corozal facility operated under the general supervision of the Ancon Hospital superintendent. New buildings were added to the Corozal Hospital in 1916, and by the following year, the average number of patients was over 300. Associated with the hospital were a poultry yard, piggery, garden, dairy, and farm (Health Department 1916:12; 1917:16). The first wooden structures of Corozal Hospital were replaced by concrete buildings in the mid to late 1920s (Chamberlain 1929:45).

Even the mode of transportation got an overhaul. During the period from 1915 to 1918, the hospital system began to make the switch from horse-drawn transports to automobiles and trucks. In 1916, for example, Ancon hospital obtained its first one-ton trucks, a motorized hearse, a "light chassis touring car" and a "light chassis ambulance" (Health Department 1916:11).

Change reached into Panama City, where the wooden structures of the Santo Tomas Hospital were replaced by concrete buildings, paid for at least in part by the Canal Zone government. After this construction was complete in 1924, American assistance to Santo Tomas was withdrawn as part of an agreement with Panamanian officials (Chamberlain 1929:65 footnote).

Gorgas Hospital, 1928

Almost as though to crown the new Ancon Hospital and all of the other health care developments, Congress decided to rename the Canal Zone's main health facility in honor of William Crawford Gorgas. On March 24, 1928, in a joint resolution (Public Resolution No. 16), the 70th Congress of the United States formally changed the name of Ancon Hospital to Gorgas Hospital (Chamberlain 1929:44; Falk 1958:121).

Two months later, on May 7, 1928, Congress established the Gorgas Memorial Laboratory, with a permanent annual appropriation of \$50,000. The laboratory was constructed the following year in Panama City, on land donated for that purpose by the Panamanian government. It has since been dedicated to further studies of malaria and other tropical diseases (Gorgas Memorial Laboratory 1928; Wright 1970:13-15).

By the end of the 1930s, construction at Ancon Hospital-- now Gorgas Hospital-- was augmented with the erection of new quarters for hospital personnel in the "Fishbowl Area," and the construction of "Herrick Heights" housing for hospital doctors and their families (Panama Canal Review 1957:13).

New Developments in the Field, 1910s-1930s

The 1914 reorganization that led to new hospital facilities on Ancon Hill, also spurred a reorganization of health facilities and sanitary districts throughout the Zone. As a rule this meant downsizing and fine-tuning, as the construction era gave way to the routine of canal operation. In the field, however, the trend toward downsizing was quickly reversed as World War I led to an influx of military personnel and the establishment of new Zone settlements. This meant a step-up in the war against malaria and the *Anopheles* mosquito.

In 1914, before the influx of World War I, the total number of sanitary inspection districts was reduced to six; most of the facilities west of the canal were then turned over to the military. The sick camps of the construction era were abolished, and there was a reduction in the number of line dispensaries from 15 to eight (Health Department 1914:13). It was also during this time that burial activity in the Zone began to be concentrated at either Mount Hope or the new cemetery at Corozal; the small district cemeteries were soon retired (Chamberlain 1929:64). The Ancon Cemetery was moved to Corozal around 1912.

The military presence in the Canal Zone had been growing even before the outbreak of World War I in the summer of 1914, but it ballooned after the United States entered the war directly, in April of 1917. By 1918, there were thousands of U.S. troops on the isthmus, as well as a burgeoning cattle industry to provide them with beef. It was also about this time that Panama City began its first expansion into the suburbs. All of this meant settlements in previously "unsanitized" areas, with new *Anopheles* breeding grounds and new cases of malaria (Health Department 1918:5-6).

The health problems posed by increased population was attacked in two ways: enlargement of the water system throughout the Zone area; and escalation and improvement in the war against mosquitos. In the late 1910s and 1920s, the water system throughout the Zone and adjacent cities was overhauled. The new system, constructed by the Municipal Engineering Division of The Panama Canal, pulled water from Lake Gatun for treatment in three large installations. From these, water was piped to Colon and Panama City, and every settlement inbetween. Cisterns and other water containers were no longer permitted anywhere in the vicinity of the Zone (Chamberlain 1929:18,36).

Work was also stepped up on rural sanitation efforts. Greater attention was placed on controlling the cattle industry, since mosquitos bred in water-filled cattle tracks. As a result, no cattle were allowed in wet areas within 1.5 miles of inhabited settlements. During the rainy season, this meant a general ban on cattle within a 1.5-mile radius of all population centers (Health Department 1918:6).

Drainage work was improved with the development of new pipes. In 1917, a sanitary inspector by the name of J. P. Corrigan devised a sectional concrete pipe that made concrete ditching easier than before. Each section was 30 inches long, with a 10-inch diameter, and had a bell joint, with male and female ends. The sections proved easy to transport and assemble (Health Department 1918:6-7; MacLaren 1972:24-25). Somewhat later came the development of the "double-decker" drain, with a concrete ditch on top to deal with the rainy season overload, and a buried tile and rock conduit below for normal operation (Chamberlain 1929:26-27; Health Department 1931:64-65).

For those areas too large or difficult to drain, improvements were made in the sprays and other materials used to kill mosquito larvae. The "larvicide" used in Gorgas' day had been worked up in the Health Department laboratory, with phenol as the active ingredient. Also used in the early days was "Paris green," or copper arsenite. By the early 1920s, both were dropped in favor of regular fuel oil, which was found to be both cheaper and more effective (Chamberlain 1929:21).

Increased population meant that garbage dump sanitation also became a problem, not only for mosquitos, but also flies and rats. By the 1920s, each day's addition to the dump was sprayed with crude oil and then capped with mud, which in turn was oiled every day for eight to 10 days (Chamberlain 1930:17).

Perhaps the greatest change in the war against the Anopheles mosquito was in the landscaping around buildings. In the old days, it was a golden rule that prominent vegetation around inhabited buildings had to be eradicated to prevent mosquito infestation. While this program was ideal for control of Stegomyia, it was found, in the early 1920s, to be less effective against the Anopheles. In fact, it was discovered that the Anopheles needed sunlight in order to breed. As a result, shade trees came back into vogue as a landscaping feature. The money that had been put into vegetation clearing was now diverted to the drainage program (Chamberlain 1929:18; 1933:114).

Aside from the continual fight against malaria, greater attention was placed on the remaining health threats in the Zone: pneumonia, tuberculosis, and syphilis (Health Department 1931:21). Pneumonia in particular was a lingering problem, especially among the "silver" or largely black employees. It was finally determined that improved quarters with less overcrowding reduced the incidence of that disease (Health Department 1918:7).

By the 1930s, a new threat appeared from an enemy thought to be completely defeated: yellow fever. Even as classic yellow fever was being isolated to a few parts of West Africa and South America, another more latent form of the disease, identified as "jungle yellow fever," was discovered throughout the forests of Central and South America. Borne by several mosquito species, jungle yellow fever was found to be virtually impossible to eradicate (Finlay 1940:147).

World War II Era

Almost coincidentally, the massive military build-up that occurred on the isthmus during World War II, had its beginnings with the abortive Third Locks Project, conceived in the late 1930s and barely underway by the time of Pearl Harbor. American involvement in World War II led to the project's cancellation, but the war brought even greater numbers of people to the Zone. By 1943, the resident population of the Canal Zone reached a record high of 126,000, most of whom were military personnel (Falk 1958:3).

World War II was responsible for a number of changes to the medical system at Gorgas Hospital. With the seizure of southeast Asia, the Japanese controlled much of the world's supply of quinine. This spurred the search for substitutes, and some of this research was conducted at the Gorgas Hospital Laboratory (Breunle 1975:59). The hospital itself was augmented. An addition, begun under the Third Locks Project, was finished in November of 1940. Known as the Gorgas Hospital Annex, this addition was a temporary one-story frame structure, with a rated capacity of 100 beds (Panama Canal Review 1957:14; Breunle 1975:54, 58). In 1944, a new mortuary building was constructed on the hospital grounds (Falk 1958:122).

The rapid increase in military personnel during World War II exacerbated the already existing conflict of interest between civilian and military authority in the Canal Zone. As early as 1922, attempts were made to place the Ancon Hospital under military control. This move was strongly opposed by the Health Department and the Zone governor, and the matter was finally dropped (Breunle 1975:55-57).

Even though Gorgas Hospital remained in civilian hands during the war, military authorities still wanted their own medical facilities. This resulted in the construction of two military Sector Hospitals, located at Fort Clayton and Fort Gulick. Fort Clayton Hospital, constructed by the U.S. Army in 1941-1943 at an estimated cost of \$4.5 million, was the Pacific Sector Hospital. A large six-story building, it was rated at a normal capacity of 378 beds, with a maximum capacity of 980. In size, it was comparable to Gorgas Hospital itself (Falk 1958:32, 212). Other military health facilities were also established, such as the Army hospital at Fort Gulick (the Atlantic Sector Hospital), and the Navy hospitals at Coco Solo and Rousseau (Panama Canal Review 1957:14).

The end of the war led to the closure of the Gorgas Hospital Annex as well as other temporary wards throughout the Zone (Breunle 1975:60), but other, more permanent construction soon followed. In August of 1951, Gorgas Hospital's new obstetrical building designed by Meade Bolton, The Panama Canal Company architect, was completed (Falk 1958:122; Breunle 1975:60).

Canal Zone and Health System Reorganization, 1950-1954

In 1950 and 1951, the Canal Zone was again reorganized. The "Panama Canal Company" was established by Congress as a public corporation to run the business operation of the canal; the rest of the Zone and its community functions were placed under the purview of the Canal Zone Government. The old Health Department was reformulated into the "Health Bureau," with the

chief health officer now designated "health director." Plans were made to phase out district medical clinics (Falk 1958:50; Breunle 1975:61-63, 184). In 1953, the hospital payment system was tightened; services that had once been free to canal employees were now billed (Falk 1958:15).

The relatively brief era of Canal Zone military hospitals ended in 1954, when Congress ordered the military to cease hospital operations and merge all major military medical facilities with those of the Canal Zone Government. Military hospitals, such as those at Forts Clayton and Gulick, were phased out. In the years that followed, military installations were only allowed to operate dispensaries (Falk 1958:51, 53; Breunle 1975:61).

The year 1954 also saw a revision in the canal treaty between Panama and the United States. By the terms of this revision, Panama was given control of sanitation in both Panama City and Colon, ending 50 years of American responsibility for health conditions in the republic's two largest cities (Breunle 1975:61-63). It was during this period that the Canal Zone's main Atlantic-side hospital was relocated from Colon to the U.S. Naval base at Coco Solo.

Review of Health Facilities, 1957-1958

In early 1957, there was a serious outbreak of malaria on the isthmus, the worst that had occurred in many years. This development spurred a general examination of health care facilities within the Zone. Undertaken by Isidore S. Falk, this review was conducted in the second half of 1957. Falk's report was submitted in January of 1958 and published the following month (Falk 1958:10; Breunle 1975:63-64).

At the time of the study, the Zone's resident population was around 46,000. With the inclusion of all others qualified for medical care at the Canal zone facilities, the treatment population was almost double that, or around 82,000 (Falk 1958:3). The main diseases within this population were malaria, dysentery, and tuberculosis (Falk 1958:6).

These diseases were treated by a health system that could be divided into two areas of activity. One was community services, which guarded against tropical diseases in the field, and the other was personal health services, which consisted of hospitals and clinics (Falk 1958:7). Community services were provided by three of the nine administrative units of the Health Bureau: the divisions of Sanitation, Preventative Medicine and Quarantine, and Veterinary Medicine. Personal health

services were provided by four of the administrative units: the Gorgas Hospital (the main hospital and the facility for the Pacific side of the canal); the Coco Solo Hospital (since the mid-1950s, the facility for the Atlantic side); the Corozal mental hospital; and the Palo Seco Leprosarium. The hospitals, or the personal health services, absorbed 90 percent of the Health Bureau's budget (Falk 1958:8,13).

The largest of the four hospital facilities by far was the Gorgas Hospital complex, which included the original nine buildings, plus the 1944 mortuary and the 1950 obstetrics clinic (Falk 1958:122). In 1957, the hospital complex was rated at 525 beds, with a maximum capacity of 885; on average, there were around 300 patients on any given day. These were served by a medical staff of around 35 doctors, 14 residents, and 15 interns. In addition to the hospital, there were the "hospital annexes," which included aid stations in Balboa and Paraiso, and dental clinics in Ancon and Gamboa (Falk 1958:14-16).

In the review, Falk noted that although the health system still worked well, it had grown complacent and was no longer a pioneer in health care and disease prevention. More specifically, Falk deduced from the flow of funds that there was a growing emphasis on personal services at the expense of community services. The Zone's health system, he stated, had grown top-heavy, with too much concentration on Gorgas and the other hospitals, and too little emphasis on preventative measures in the field (Falk 1958:2-8). In the "Sanitation" and the "Preventative Medicine and Quarantine" divisions, both crucial to the war against tropical diseases, Falk noted that the staff was too small for the job (Falk 1958:8-10, 85-87).

Falk also attacked Gorgas Hospital itself, which he claimed was obsolete. Rather than rebuilding the hospital, as had been done 40 years ago, Falk suggested that the Zone's main hospital facilities be transferred to the Fort Clayton Hospital, built by the Army during World War II and closed by Congress in 1954 (Falk 1958:209, 212).

Later Changes

Despite Falk's recommendation, Gorgas Hospital was not abandoned in favor of the Fort Clayton facilities. In 1957, the Middle America Research Unit was established in one of the Gorgas Hospital buildings. By 1970, this unit had a staff of 67 (MacLaren 1972:77-79). Gorgas itself was augmented in 1965 with the permanent addition of an eight-story building to the hospital

complex. This building contained facilities for surgery, physical therapy and intensive care, radiology, and pathology (Breunle 1975:65; The Pulse 1982:3).

It was shortly afterwards, however, that international events overtook Gorgas, the Health Bureau, and everything else in the Canal Zone. As a result of the 1977 canal treaty between Panama and the United States, ratified by the U.S. Senate the following year, much of the Zone was to revert back to Panama in 1979, with the remainder to follow 20 years later. With the exception of the canal operation itself, most civilian functions within the Zone ceased in 1979, and this included the hospital system as well.

With the exception of Palo Seco, which passed to Panama, Gorgas Hospital and all health care facilities in the former Zone were placed under the control of the U.S. Army Medical Activity-Panama. At that point, Gorgas Hospital was formally designated Gorgas Army Hospital (The Pulse 1982:3). According to a schedule worked out by both Panama and the United States, the Gorgas Army Hospital will be transferred to the Republic of Panama in 1997.

PART II. ARCHITECTURAL INFORMATION

A. General Statement:

1. Architectural Character:

The architecture of Gorgas Hospital is monumental in scale and classical in style. The buildings are concrete, two and three stories in height with low pitched, hipped red Spanish tile roofs with projecting wings. The architecture is Italian Renaissance in style and displays detailing characteristic of that style. The Administration and Clinics Building (237) is the focal point of the complex with a symmetrical facade featuring filled-in arcaded arches leading to a recessed entry with a balustraded balcony. Two flanking towers abut the entry area. The hospital sections and associated buildings are connected by covered, raised, balustraded passageways and porte cocheres extend over Culebra Road which negotiates the complex.

2. Condition of Fabric:

The Gorgas Hospital buildings are in good condition and are currently in use as clinics, for administration purposes, and as barracks. Therefore their fabric has been maintained although altered to accommodate new uses and air conditioning. All but the Isolation Ward, which has been painted on the exterior, bear a distinctive reddish patina. The 1941 Mortuary Building (Building 257) is the best preserved of the hospital study buildings.

B. Site

1. General Setting:

The hospital complex is situated on a spur on the northeast slope of Ancon Hill, an elevation that offers partial views of Panama City and the Bay of Panama. The layout of the buildings conforms to the topography and echoes the layout of the earlier French Hospital. The main building concentration contains Administration and Clinics Building, Kitchen and Mess, Shops and Boiler House, Sections A and B, and the Main Stairs. This concentration of buildings projects out from Ancon Hill in a prow-like fashion and is bounded on the east by Gorgas Road. A triangular inner courtyard between the Administration and Clinics Building, Sections A and B, and the main staircase is rimmed by Culebra Road.

Buildings 236, 234, 235 and 257, 261 extend to the northwest of the main building concentration on both sides of Gorgas Road. Buildings 236 and 224, on the west side of Gorgas Road are bounded on their rear elevation by Culebra Road which abuts Ancon hill. The intersection of Culebra Road and Gorgas Road is considered the Hospital Entrance. South of the main building area lies the Superintendent's Residence (286) and Herrick Heights, the doctor's housing reservation. The Dispensary Building (287), and Nurses' Residence (263) lie southeast of the main complex area. The overall character of the setting is topographically interesting and the use of available building space is concentrated.

2. Landscaping, Enclosures:

Gorgas Hospital takes full advantage of the sloped elevation on which it is situated. The Administration and Clinics Building (Building 237) and the Kitchen and Mess Building

(Building 238) are located on the highest terrace, while the Main Staircase is located on a lower terrace connecting the inner court with Gorgas Road. Despite each building's unique elevation, all are joined and passageways and steps help to unite these buildings into a plan that takes advantage of the terraces. The portion of Ancon Hill behind the hospital is undeveloped with foundations of the French hospital buildings still visible mingled with rocks deliberately embedded into the hill's surface from a past effort to deter erosion. The grassy triangular courtyard in front of the Administration and Clinics Building is divided by three concrete paths that descend to Culebra Road and access the entry wings of the adjacent buildings and the Main Staircase that leads to Gorgas Road. Historic photographs indicate that the existing vegetation is a mix of historic plantings and modern efforts. Angled parking has been added to Culebra Road within the courtyard. The area to the north of the complex is uniquely sited with Buildings 224, and 236 on a higher elevation than Buildings 235, 257, and 261. Buildings 224 and 236 are situated on a grassy elevation facing the road while the latter buildings are at street level with a setback just wide enough to accommodate a sidewalk. The Superintendent's Residence (Building 286) and the Dispensary (Building 287) are situated across from each other, each facing Gorgas Road. The former Nurses' residence (Building 263), angled and situated on a slope lower than Gorgas Road and opposite the main stairs, is separated from Building 261 by a concrete parking lot.

At the time of the study, the buildings that are currently operated and maintained by USA MEDDAC-Panama and USSOUTHCOM were surrounded by an eight foot high chain link fence topped with barbed wire. These are: Buildings 237, 238, 255, 253, 261, 254, and 242. Buildings 236, 224, and 263 which are owned and maintained by the Republic of Panama were painted and were not enclosed by a fence. From a landscape perspective the once integrated plan that Gorgas Hospital represented is intact but is confused by differences set in place by different adaptive uses and by different treatment plans by owners.

3. Buildings:

The complex contains administrative, hospital and clinic buildings as well as some support buildings such as power houses, storage sheds and garages.

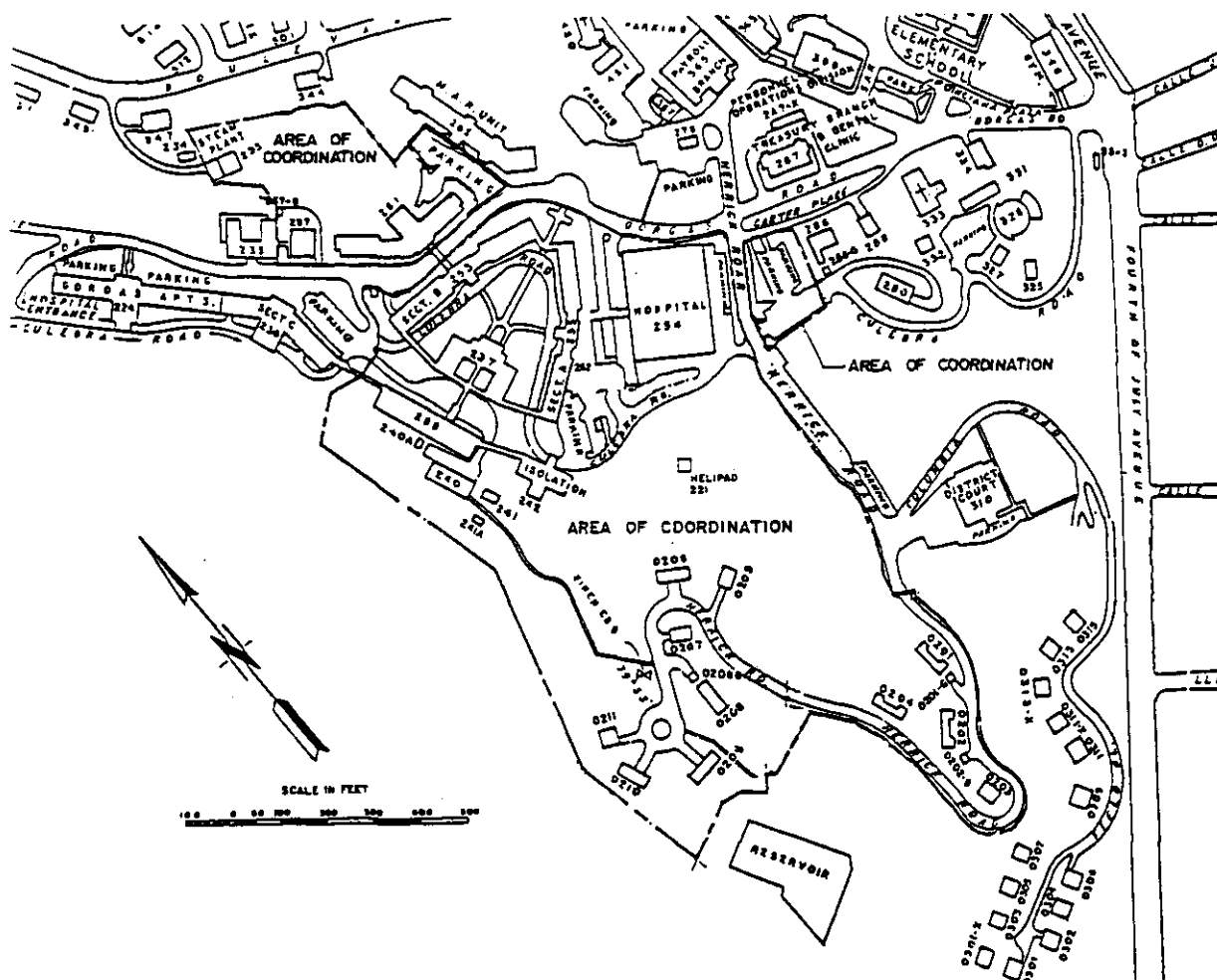


Figure 1

Map, 1996 (original located at Real Property Office, Corozal)
Mapmaker unknown.
GORGAS ARMY HOSPITAL

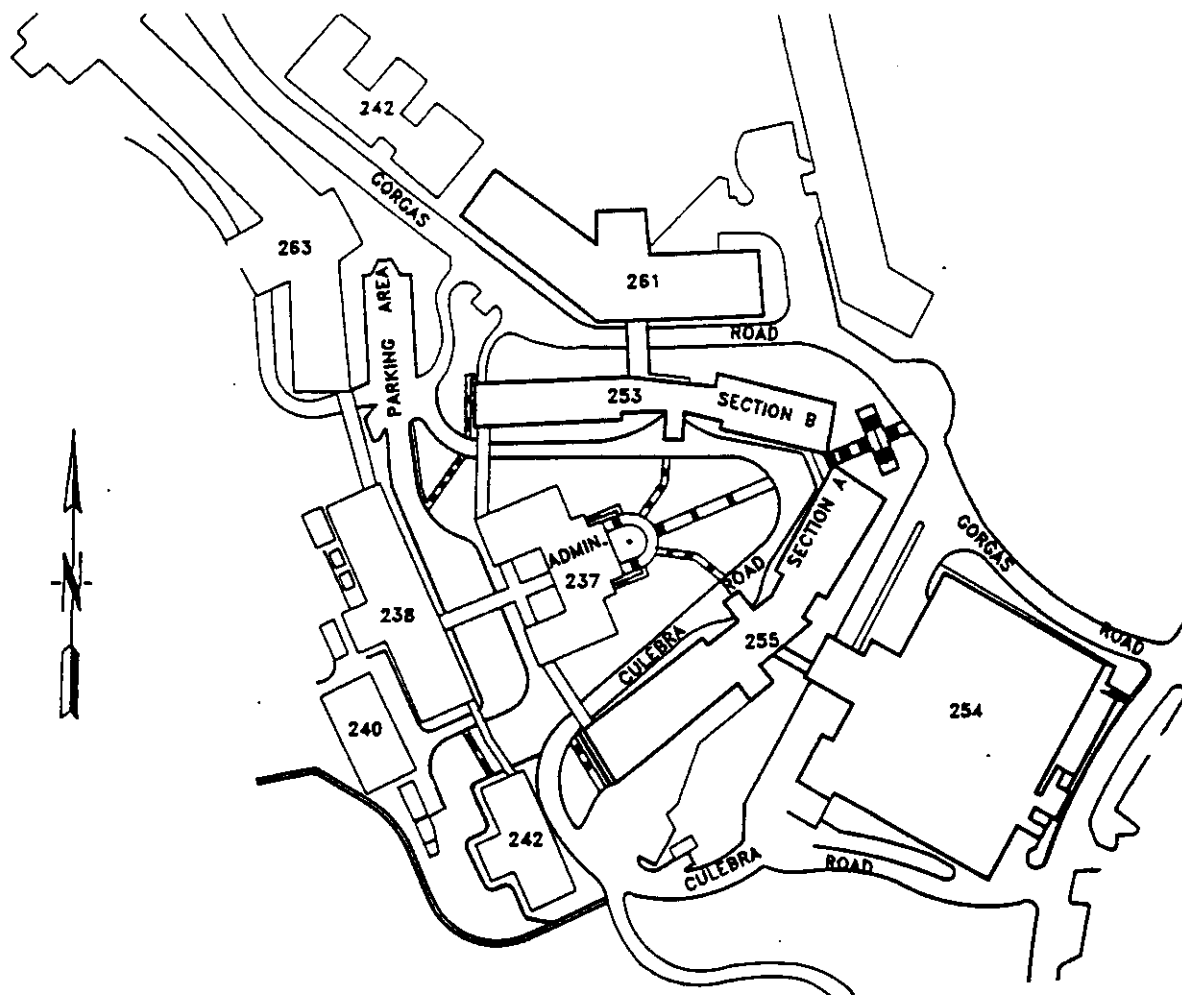


Figure 2.

Map, 1996 (original map located at Real Property Office, Corozal)
Mapmaker unknown.
GORGAS ARMY HOSPITAL COMPLEX

PART III. SOURCES OF INFORMATION

A. Architectural Drawings:

Drawings for Gorgas Hospital are housed at the Engineering and Planning Office, Panama Canal Commission, Balboa, Republic of Panama and at the Directorate of Engineering and Housing (DEH), U. S. Army Garrison-Panama, Corozal, Republic of Panama. With the exception of Buildings 257 and 261, the study buildings were all constructed between 1915-1919. Architectural plans that show the changes in these buildings over the seventy-seven years of their use are numerous, showing the modifications necessary to keep the buildings in usable condition as a healthcare facility and also showing the change in the building's interiors as their primary use changed over time.

HABS No. CZ-11-A - Building 237 - As-built drawings, numbered 4131-10 through 4131-19, were located at the Engineering and Planning Office, Panama Canal Commission, Balboa, Republic of Panama. Modifications to the building are also recorded on drawings at DEH numbered 4131-6 through 4131-9; 4131-304; 4131-305; 4841-404; 4131-431 through 4131-436; 4131-440 through 4131-441; 4851-413 through 4851-415; and 52108-1. These plans include the installation of an emergency power system and renovations to the electrical system and plumbing. Plan 52108-1 shows the details of proposed roof repair.

HABS No. CZ-11-B - Building 238 - As-built drawings, numbered 4137-4 through 4137-6; 4137-8 through 4137-11 were located at the Engineering and Planning Office, Panama Canal Commission, Balboa, Republic of Panama. DEH also maintains more recent architectural drawings, such as 4137-61 through 4137-65 which describe a 1966 renovation undertaken by the Panama Canal Company. Plans 4137-410; 4137-414; 4137-16 through 4137-19, 4137-428 through 4137-431 describe emergency wiring and the addition of a fire alarm system. Older plans dating to 1941 were also on file at DEH that show wiring changes to the building (Plans 1033-36 and 4137-405). Plan 52111 shows proposed roof repair in 1994.

HABS No. CZ-11-C - Building 240 - As-built drawings, numbered 4198-1, 4198-2, 4198-6, 4198-7, 4198-10, were located at the Engineering and Planning Office, Panama

Canal Commission, Balboa, Republic of Panama. DEH also maintains more recent architectural drawings of this support structure.

HABS No. C-11-D - Building 242 - As-built drawings, numbered 4133-1, 4133-9 through 4133-13; 4133-15 through 4133-20 were located at the Engineering and Planning Office, Panama Canal Commission, Balboa, Republic of Panama. DEH also maintains plans that show historic modifications such as the rewiring of the building (4133-401 through 4133-406).

HABS No. CZ-11-E - Buildings 253 and 255 - Plans for these twin buildings are archived under two numbers. Plans for Building 253 are registered under series 4071 while plans for Building 255 are registered under series 4021. As built drawings, numbered 4071-7; 9-10; 4071-15-20, were located at the Engineering and Planning Office, Panama Canal Commission, Balboa, Republic of Panama. DEH also maintains more recent architectural drawings, plans 4021-100 and 4021-102 through 108, which record remodeling alterations and plans 4021-407 through 4021-447 which record the addition of air conditioning, the updating of plumbing and electrical rewiring, and the addition of fire protection improvements in the 1970s.

HABS No. CZ-11-F - Building 257 - As-built drawings, numbered 4695-1 through 4695-11, were located at the Engineering and Planning Office, Panama Canal Commission, Balboa, Republic of Panama. DEH also maintains more recent architectural drawings that show plumbing and wiring updates, and the addition of air conditioning (Plans 4695-24, 4695-36 and 4695-37, 4695-406 through 4695-410).

HABS No. CZ-11-G - Building 261 - As-built drawings, numbered 4847-3 through 4847-10, were located at the Engineering and Planning Office, Panama Canal Commission, Balboa, Republic of Panama. DEH also maintains more recent architectural drawings including the plans drawn in 1958 for the addition of an emergency power system (Plan 4131-45) as well as numerous plans that show that the building was replumbed, rewired and air conditioned (Plans 4847-477; 4847-481; 4847-496-497; 4847-462 through 4847-495).

HABS No. CZ-11-H - Main Entry - No architectural drawings were found.

HABS No. CZ-11-I - Passageways - As-built drawings, numbered 4135-1, 4135-2, 4135-7, 4135-8 and 4135-13, were located at the Engineering and Planning Office, Panama Canal Commission, Balboa, Republic of Panama.

B. Early Views:

The original print shown as Photograph HABS No. CZ-11-1 was located at the Panama Canal Commission Technical Resources Center, Balboa, Republic of Panama. Its negative is stored in Record Group 185-G, The Panama Canal Collection Series in the National Archives, Washington, D.C.

The Panama Canal Commission Technical Resources Center and the National Archives have an extensive historic photograph collection documenting the canal construction period and its later operation under the title "Panama Canal Collection." The National Archives, Washington, D.C., holds the negatives to this photographic collection within Record Group 185-G, The Panama Canal Collection Series. Photographs showing Gorgas Hospital are contained in Photographic Volumes 1, 15, 16, 22, and 23 at the Panama Canal Commission Technical Resources Center, Balboa, Republic of Panama. The *Report of the Health Department of the Panama Canal for the Calendar Year 1919* and the *Annual Report of the Governor of the Panama Canal for 1917*, both on file at the Panama Canal Commission Technical Resources Center, also contain many early views of Gorgas Hospital.

C. Publications produced by The Panama Canal and Panama Canal Company:

As the Real Property Records for these buildings begins in 1977 with their transfer to the Department of Defense, the prior history of these buildings' use and construction is best found within *The Report of the Health Department of The Panama Canal* published each year by The Panama Canal Press in Mount Hope, Canal Zone, and the *Annual Report of the Governor of the Panama Canal* published yearly by the Government Printing Press. These documents on file at the Panama Canal Commission Technical Resources Center contain important primary data on the Gorgas Hospital complex.

D. Interviews:

Mr. Eric Nicolaisen, Chief of Mortuary Services
Ms. Maria Elena Diva, MEDAC Administrator
Ms. Suzanne Johnson, DEH Planning
Ms. Lolita Cook, PCC Engineering Section

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E. Likely sources not yet investigated:

None

F. Supplemental Material:

None

PART IV. PROJECT INFORMATION

This project conducted by New South Associates was funded by USARSO and coordinated through Mobile District Corps of Engineers. Ms. Dorothy Gibbens served as the Contracting Officer's Technical Representative and oversaw the technical administration of this project. The project buildings included eight of the original Gorgas Hospital buildings which are currently owned and operated by USA MEDDAC-Panama and USSOUTHCOM. These include: Administration and Clinics Building (Building 237); Kitchen and Mess (Building 238); Shops and Boilerhouse (Building 240); Section A (Building 255); Section B (Building 253); Section O (Building 261); Isolation Ward (Building 242); and Mortuary and Chapel (Building 257).

The project historian was Mark Swanson while Mary Beth Reed served as architectural historian. Mr. Richard T. Bryant produced the large format photographs contained in this report. Dr. J. W. Joseph served as the principal investigator for this study. Documentation was coordinated through Ms. Gibbens of the Mobile District Corps of Engineers with assistance from the Directorate of Engineering and Housing, Panama, with Suzanne P. Johnson, volunteer, under the direction of Mr. Daniel Muschett, Chief of the Directorate of Engineering and Housing (DEH) Environmental Office.